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George V. Voinovich
Governor

February 22, 1999

RE: RMI TITANIUM CO.
SODIUM PLANT
ASHTABULA COUNTY
OHD 000-810-242

Mr. Thomas Matheson
Mail Code HRP-8-J
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Matheson:

Ohio EPA appreciates the opportunity to comment on the *Supplement to the Revised Final Corrective Measures Study RMI Titanium Co. - Sodium Plant Ashtabula, Ohio*. Ohio EPA has included the following attachments with comments for documents leading to this supplement:

1. **Attachment 1** - *RCRA Facility Investigation Report RMI Sodium Plant, Ashtabula, Ohio Volume 1 and II* (dated June 1990);
2. **Attachment 2** - *Final Corrective Measures Study RMI Sodium Plant, Ashtabula. Ohio Volume 1* (dated March 1993);
3. **Attachment 3** - *Groundwater Monitoring Plan for the Closed Landfill (Area A) RMI Sodium Plant, Ashtabula, Ohio* (November 1997);
4. **Attachment 4** - *Draft Statement of Basis RMI Sodium Facility, Ashtabula* (received June 14, 1996); and
5. **Attachment 5** - OEPA Comments on RMI Titanium Co. Sodium Plant CMS.

Attachment 6 contains Ohio EPA's comments on *Supplement to the Revised Final Corrective Measures Study.* Details regarding Ohio EPA's concerns can be found by reading the other attachments.

The comments in Attachments 1 - 5 have been forwarded to USEPA in the past. Ohio EPA is forwarding them again so that there is a clear understanding regarding Ohio EPA's past and present concerns.

Please note the following. RMI has responded to Ohio EPA's comments of Attachment 3. The response is now under review. Comments in Attachments 1, 2, and 3 focus on the groundwater. Attachment 4 and 5 discuss other aspects of the documents.

If you have any questions please contact me at (330) 963-1250.

Sincerely,

Adrienne La Favre

Adrienne La Favre
District Representative
Division of Hazardous Waste Management

ALF:cl

cc: Frank Popotnik, DHWM, NEDO, OEPA
David Sholtis, DHWM, CO, OEPA
Ed Lim, DHWM, CO, OEPA

ATTACHMENT 1

RCRA Facility Investigation Report
RMI Sodium Plant, Ashtabula, Ohio, Volume I and II, dated June 1990
Received by the Ohio EPA on March 6, 1995

INTRODUCTION

The RCRA Facility Investigation Report (RFI) was submitted to the Ohio EPA on behalf of the RMI Sodium Plant (RMI) facility located near the intersection of State Road and East Sixth Street in Ashtabula, Ohio. This RFI was required to determine the nature and extent of possible contaminant releases from previous and existing solid waste management units at the RMI facility and to determine if the site contamination resulted from contaminants migrating into the facility area from off-site property.

COMMENTS

1. The facility included a water table elevation contour map based on data collected on 1/10/89. Another data set collected on 11/17/88 was available, but this data was not plotted on a contour map. The pattern of ground water flow in the site area, as indicated in the 1/10/89 map, appears to be complicated by the clay-lined ponds throughout the site. The general trend is mounding of ground water on the clay-lined landfills and ground water flow radially away from the landfills. The facility should contour the other data set, indicate significant differences in ground water flow direction, and address seasonal variations.

2. The statement in page 4-25 that "ground water occurs under fully confined conditions in the deeper shale bedrock water bearing zone" is unacceptable due to the following reasons:

   a. The facility indicated that the piezometric surface occurs "at or near the water table surface throughout the site," based on the data from monitoring wells 4D and 5D. Based on the data in Table 4-2, the elevation of the piezometric level at well 4D was about three feet lower than the water table at the shallow well 4S, located approximately at the same location. The water level at well 5S and the piezometric level at well 5D occur approximately at the same elevation. From these evidences, it appears that water in the bedrock shale is not under excessive pressure to indicate a hydrostatically confining condition.

   b. Based on estimates from off-site areas, the hydraulic conductivity of the unweathered till may range from $5.1x10^{-8}$ to $2.4x10^{-8}$ cm/sec with a geometric mean of $8.1x10^{-8}$ cm/sec. This range overlaps with the hydraulic conductivity range of the underlying bedrock from $1.7x10^{-6}$ to $6.2x10^{-8}$ cm/sec. Thus, from the stratigraphic point of view the unweathered till does not represent a confining layer for the bedrock shale.

c. Page 4-22 indicated that "only a minimal downward vertical gradient exists" between the water bearing zones in the glacial till and bedrock shale. If there is a "downward vertical hydraulic gradient," it is unclear how the bedrock shale can be "under fully confined conditions."

The facility should evaluate the above mentioned statement in the light of these issues based on a contour map of the potentiometric surface.

3. The facility in page 4-25 assumed that the slope of the piezometric surface is "toward the north."

   a. The elevation of the piezometric surface is known only from two monitoring wells, 4D and 5D, and thus, a contour map of the piezometric surface in the facility area was not prepared.

   b. The data of 11/17/88 and 1/10/89 monitoring events presented in Table 4-2 indicate that piezometric levels at wells 7D, 9D, and 11D were not stabilized and were rising. Thus, depending on the elevation of the piezometric level at these wells, the horizontal flow direction of ground water in bedrock shale may be different than the report indicated.

   c. The facility indicated that monitoring well 11D, located at the southwestern corner of the site area, is an upgradient well relative to the solid waste management units. The report lacks adequate data to indicate monitoring well 11D is an upgradient well.

   To determine the slope of the piezometric surface and to determine if well 11D is in the upgradient direction, the facility should gather data from all the available deep wells in the site area (4D, 5D, 7D, 9D, 11D) after piezometric levels in these wells are stabilized.

4. The facility considered shallow monitoring wells 9S and 10S as background wells based on the following:

   a. Their locations are farthest from the solid waste management units.

   b. Ground water at these two locations is apparently least impacted by the solid waste management units.

   c. Ground water chemistry as indicated by major ion data is different at these locations.

   However, as indicated by the facility, due to the complexity of the ground water flow pattern in the site area, the actual upgradient direction could be different.

5. At the facility area, the suspected contaminants in the closed landfills and former landfill areas included barium, cadmium, and lead. The highest concentrations of barium and cadmium in shallow (glacial till) ground water (Table 1) were found near the southern property boundary (4S) and the wastewater treatment ponds and landfill areas near the eastern property boundary (6S, 8S, 5S). Ground water exceeded the maximum contaminant levels (MCLs) of cadmium at 4S, 5S, 6S, 7S, and 8S. These results indicate that ground water in the glacial till zone is

impacted by the activities within the facility area.

Table 1: Highest concentration of barium, cadmium, and chromium at different locations in two sampling events on 11/17/88 and 1/11/89. S and D with the well number indicates depth, S is shallow (glacial till) and D is deep (shale). Exceedences of MCL are indicated in italics. Lead was below the detection limit (10.0 ug/L) at all locations.

Well #	**Barium** MCL = 2,000 ug/L	**Cadmium** MCL = 5 ug/L	**Chromium** MCL = 100 ug/L
3S	1,200	4.0	9.8
4S/ 4D	830/*6,800*	*14.3*/ 2.6	14.5/ 8.2
5S/ 5D	610/ *6,210*	*9.7*/ 2.8	9.8/ 8.3
6S	1,500	*25.7*	>5.0
7S/ 7D	>500/ >500	*8.3*/ >1.0	5.9/ 8.1
8S	1,900	*11.7*	13.0
9S/ 9D	>500/ 1,400	1.3/ 6.3	13.6/ 13.5
10S	>500	>1.0	8.4
11D	*18,000*	*7.9*	11.6

6. The facility calculated the specific capacity by using data from monitoring wells at the RMI facility and RMI Extrusion Plant sites because well yield data at or near the site area were unavailable. In this calculation, the facility used a value 0.3 for the "storativity" value of the weathered and unweathered tills and referred to Freeze and Cherry (1979). The appropriate term for storage in unconfined aquifers is specific yield or unconfined storativity, and not "storativity" which is used for confined aquifers. The usual range of specific yield noted in Freeze and Cherry (1979, p. 61) is 0.01 to 0.30. Since the specific yield in an unconfined aquifer represents actual dewatering of the saturated zone, and since the site area consists of weathered clayey till, the "storativity" value was considered very high by the DDAGW. A calculation based on a specific yield of 0.1 provided a total yield of 91 gpd as compared to 117 gpd calculated by the facility using a specific yield of 0.3. Thus, the yield values calculated by the facility are overestimated. The calculation of specific capacity and yield was apparently based on the assumptions that well loss is zero and the upper saturated zone can be completely dewatered and 80% of the lower saturated zone can be dewatered. The facility should use appropriate terminology to avoid confusion, should use a specific yield value within the lower part of the range noted in Freeze and Cherry (1979, p. 61), recalculate the specific capacity, and discuss these assumptions in the report.

7. The facility proposed that the ground water in the glacial till zone at the site area be classified as class IIIA (US EPA, 1986) based on the following criteria:

   a. The calculated yield less than 150 gpd, the yield needed to provide for the needs of any average-size household.

   b. No well or spring installed in the unconsolidated glacial till within the classification review area (delineated by a circle of two-miles radius from the center of the site area) is used as a source of drinking water.

8. The facility calculated a linear velocity of ground water flow varying from 0.7 ft/year throughout the majority of the site to 7.0 ft/ year immediately adjacent to the clay-lined wastewater treatment ponds. This calculation assumes a homogeneous saturated zone. Flow through preferential pathways, e.g., interconnected sand lenses, may result in a much faster ground water flow velocity than calculated in the report.

9. The presence of a DNAPL layer comprised of chlorinated solvents was detected in well 2S located at the southern boundary of the site area. Apparently, no DNAPL layer was detected at well 1S located about 350 feet west from 2S and screened at a similar depth interval. However, a relatively high concentration of volatile organic contaminants (VOCs) was detected in ground water at 1S and PZ-8, indicating that DNAPL compounds are being dissolved in ground water.

10. The monitoring wells 1S and 2S are screened in the unweathered glacial till that included a sandy till layer several feet thick. This sandy unit, also detected at 11D, may extend toward the southern boundary of the facility. The cross section through wells 2S, 1S, and 11D in Figure 4-9 indicates that the lower surface of this sandy till slopes toward 2S. Based on the assumption of a southward extension of the sandy till layer and the apparent slope of the lower surface of this layer, it is likely that if DNAPL is released upgradient it may migrate toward 2S.

11. The facility indicated that no chlorinated solvent was ever used at the site area and a chemical manufacturing facility located on the southern border of the site has historically discharged chlorinated solvents to streams and in settling lagoons that were not lined. From this information, it appears that the presence of a DNAPL layer at well 2S may be linked to the waste management practices from an off site area.

12. The thickness of the DNAPL layer at monitoring well 2S was not determined. A 10 feet thickness was estimated in the report. The facility should determine the vertical extent of this layer and estimate the volume of DNAPL.

13. The facility did not analyze ground water samples from 1S and 2S for the inorganic constituents and dissolved metals. Thus, whether some of the dissolved metals occur in these samples at elevated concentrations is unknown. The facility should consider this possibility.

14. The water table elevation at well 2S is indicated to be approximately 1.5 ft above ground surface (ags) in page 4-18 and approximately 1.0 ft ags in page 6-32. The latter elevation seems to be close to the actual elevations given in Table 4-2. The facility should correct this error.

15. The facility presented a contour map of static water table elevation in Figure 4-11.

    a. Water table elevation contours are indicated as continuous line and broken line. The facility should indicate the difference between these two types of contour lines in the map.

    b. The facility does not have any data control in support of the contour patterns indicated near the southern boundary and the northwestern corner of the site area. These contours should be removed from the map or be substantiated by ground water elevation data that was not included in the submittal.

    c. The facility indicated that the ground water flow direction in the glacial till is "perpendicular to the ground water contours." Some arrows representing the ground water flow in Fig. 4-11 are not at right angles to the ground water contours. The facility should correct this error in Fig. 4-11.

16. Since the weathered till contains large vertical fractures lined with fine sand, the ground water flow direction may be influenced by these fractures. As a result, the actual direction of ground water flow in this zone may deviate from the direction determined solely based on the contours of water table elevations. The facility should consider this possibility and indicate it in the report.

17. The facility did not discuss the underlying assumptions with the method used to estimate the hydraulic conductivity from recovery data. The facility should address whether the assumptions of homogeneous, isotropic, infinite aquifer, incompressible water and aquifer matrix are valid in the tested area. If any of these assumptions is violated, the facility should address the affect of this on the calculated value of hydraulic conductivity.

18. The facility did not include the chain of custody records within the report and did not indicate whether quality control/quality assurance samples for ground water analysis were a part of the sampling plan. The facility should include this information and chain of custody records in the report.

CONCLUSION

In this RCRA facility investigation report, the facility classified the ground water in the site area as class IIIA based on insufficient yield. These calculations used high a specific yield value. The facility should re-calculate the specific capacity by using a lower value of specific yield. The ground water in the glacial till zone is impacted by the activities within the facility area. The MCLs of cadmium were exceeded at 4S, 5S, 6S, 7S, and 8S. The water table elevation contour map is based on one data set. The facility should use additional data sets to address any change in ground water flow pattern in the site area. The facility indicated a fully confined condition in the bedrock without providing adequate evidence for this occurrence. If confining condition exists in the bedrock, a potentiometric surface map for bedrock should be prepared and ground water flow directions on this map should be indicated. At monitoring well 2S, the presence of a DNAPL layer was detected and was attributed to the waste management practices of a chemical manufacturing facility located adjacent to the southern boundary of the facility area. Based on the available information, it is likely that DNAPL released near the southern boundary may migrate through the sandy interval of the glacial till layer toward 2S.

REFERENCE

U.S. Environmental Protection Agency, 1986. Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy, Final Draft. Office of Ground-Water Protection, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

ATTACHMENT 2

Final Corrective Measures Study
RMI Sodium Plant, Ashtabula, Ohio
Volume I (dated March 1993 and Revised September 1994)
Received by the Ohio EPA on September 15, 1994.

INTRODUCTION

The report on the Final Corrective Measures Study (CMS) was submitted to the Ohio EPA on behalf of the RMI Sodium Plant (RMI) facility located near the intersection of State Road and East Sixth Street in Ashtabula, Ohio.

COMMENTS

1. The facility indicated (p. 2-20) that a "downward leaching of constituents from surficial soils to shallow ground water" is not occurring. This is contradicted by the following statements:

   a. Cadmium (Cd) in ground water in the vicinity of the ponds is "also related to leaching from the fill areas near the ponds" (p. 3-13).

   b. The elevated concentrations of barium (Ba) and Cd in shallow ground water "in the areas north (Area G) and east of the water treatment ponds (Area D)" are, in part, attributable to "the leaching of subsurface soils or buried wastes" (page 1-8).

   The facility should correct these discrepancies in the CMS report.

2. The facility indicated (p. 2-59, Table 2-26) the metal concentrations as "total" concentrations.

   a. According to the RCRA Facility Investigation (RFI) Report, RMI Sodium Plant (p. 3-9), the ground water samples for metal analysis were filtered in the field and thus, metal concentration represents the dissolved concentration.

   b. Table 3-4 in the CMS report summarized the February-March 1991 sampling data for Ba and Cd, both as "total" and "dissolved" concentrations. Apparently two sets of ground water samples (filtered and unfiltered) were collected and analyzed during this sampling event. However, the collection of unfiltered ground water samples is not indicated in the CMS report.

   The facility should clarify this sampling information within the report.

3. Based on the work completed during the RFI, the facility indicated (p. 1-7) that a confined condition exists in bedrock shale and that "the horizontal flow of ground water in the shale is toward the north to Lake Erie."

a. Confined condition in Shale: This is unacceptable due to the following reasons stated in the RFI report:

i) The elevation of the piezometric level at well 4D was about three feet lower than the water table at the shallow well 4S, located approximately at the same location.

ii) The water level at well 5S and the piezometric level at well 5D occur approximately at the same elevation.

It appears that water in the bedrock shale is not under excessive pressure to indicate a hydrostatically confining condition.

b. Ground Water Flow Direction: A northward flow direction of ground water in shale is not substantiated at the facility area by data.

i) The elevation of the piezometric surface is known only from two monitoring wells, 4D and 5D, and thus, a contour map of the piezometric surface in the facility area was not prepared.

ii) The data of 11/17/88 and 1/10/89 monitoring events presented in Table 4-2 indicate that piezometric levels at wells 7D, 9D, and 11D were not stabilized and were rising. Thus, depending on the elevation of the piezometric level at these wells, the horizontal flow direction of ground water in bedrock shale may be different than the report indicated.

The facility should re-evaluate the ground water condition in bedrock shale based on a contour map of the potentiometric surface. To determine the ground water flow direction, the facility should gather data from all the available deep wells (4D, 5D, 7D, 9D, and 11D).

4. The facility considered shallow monitoring wells 9S and 10S as background wells and indicated (p. 1-6) that "the ground water is mounded around the ponds at the site and the overall ground water flow directions radiate outward from the site." Considering this complexity in the ground water flow pattern in the site area, the actual upgradient direction could be different.

5. Documentation:

a. 11/18/88 and 1/11/89 Sampling: The facility in the RFI report indicated (p. 3-10) that the ground water "samples were preserved in accordance with U.S. EPA protocol." The chain of custody records indicating the preservatives added, time and day of sampling, temperature of the sample shipping container and the date and time when the samples were received by the analytical laboratory were not included in either of the CMS or RFI reports. Without evaluating the chain of custody records, the adequacy of sample preservation cannot be ascertained. The facility should include the chain of custody records in the report.

b. February-March 1991 Sampling: The facility did not include the field data sheets, chain of custody records, and laboratory data sheets of this sampling event in the CMS report. These documents should be included in the report.

6. Contaminant Concentrations in Shallow Monitoring Wells: The suspected contaminants in the closed landfills and former landfill areas included Ba, Cd, and lead (Pb). The facility indicated (p. 2-75, p. 3-12) that "concentration of constituents in shallow ground water monitoring wells are generally below maximum contaminant levels (MCLs)." This statement is misleading because of the following reasons:

a. Out of eight shallow monitoring wells (excluding 1S and 2S), Cd concentration exceeded the MCL in five wells (4S, 5S, 6S, 7S, and 8S) during the sampling of 11/18/88, in four wells (4S, 5S, 6S, and 8S) during the sampling of 1/11/89, and in one well (6S) during the sampling of February-March 1991. The action level of Pb was exceeded only in 10S during February-March 1991 sampling (Table 1).

Table 1: Concentrations of Ba, Cd, Chromium (Cr), and Pb at different shallow wells during three sampling events. Exceedences of MCL or action level are indicated in bold print.

Well #	Sampling Date	Barium MCL = 2,000 ug/L	Cadmium MCL = 5 ug/L	Chromium MCL = 100 ug/L	Lead Action Level = 15 ug/L
3S	11/18/88	910	4.0	9.8	<10
	1/11/89	1,200	1.4	9.7	<10
	Feb.-Mar./91	1,400	<1.0	19.8	11.8
4S	11/18/88	<500	**11.8**	14.5	<10.0
	1/11/89	830	**14.3**	8.0	<10.0
	Feb.-Mar./91	560	4.0	5.9	5.4
5S	11/18/88	530	**6.5**	9.8	<10.0
	1/11/89	610	**9.7**	6.9	<10.0
	Feb.-Mar./91	910	4.1	8.5	11.4
6S	11/18/88	1,500	**18.3**	<5.0	<10.0
	1/11/89	1,100	**25.7**	<5.0	<10.0
	Feb.-Mar./91	2,000	**7.9**	<5.0	<10.0
7S	11/18/88	<500	**8.3**	5.9	<10.0
	1/11/89	<500	4.0	<5.0	<10.0
	Feb.-Mar./91	270	1.4	8.2	4.4
8S	11/18/88	1,900	**11.7**	<5.0	<10.0
	1/11/89	830	**6.9**	13.0	<10.0
	Feb.-Mar./91	*	*	*	*

9S	11/18/88 1/11/89 Feb.-Mar./91	<500 <500 <500	<1.0 1.3 <1.0	<5.0 13.6 2.7	<10.0 <10.0 3.6
10S	11/18/88 1/11/89 Feb.-Mar./91	<500 <500 250	<1.0 <1.0 <1.0	6.1 8.4 19.6	<10.0 <10.0 **18.7**

* No sample was collected from 8S because well was dry at the time of sampling.

b. Ground water samples were not collected from the monitoring wells 1S and 2S, due to the presence of dense nonaqueous phase liquid (DNAPL) at these wells. Thus, the impact of the facility activities on ground water in 1S and 2S was not evaluated.

c. Well 8S was not sampled during the sampling of February-March 1991. Thus, the possibility of Cd exceeding its MCL during this sampling cannot be ruled out.

Thus, the above-mentioned statement is not true for the Cd concentration. The facility should make appropriate corrections to this statement.

6. <u>Data of 12S and 13S</u>: With regard to these two wells, the facility indicated (p. 1-12) that "..two wells (12S and 13S) were installed to provide information on the occurrence and quality of ground water in the glacial till water-bearing zone in the vicinity of the eastern boundary" and that the data for these wells were not included in Table 2-26 "because these wells are located outside of RMI property and isolated from the RMI site by a ground water divide." The results of 12S are briefly mentioned in page 3-9 of the CMS report. To determine whether water at 12S and 13S are affected by the facility, or the opposite, it is necessary to consider the water quality at these locations. The facility should include all the results of the two wells in the report.

7. <u>Off-site Migration of Contaminants:</u>

a. <u>Influence of Coal Pile</u>: The facility indicated that ground water in well 12S is influenced by a off-site coal pile located to the east of the site. According to Table 3-1, ground water collected from 12S during February-March 1991 contained dissolved Cd at a concentration (26.8 ug/L) exceeding the MCL. The facility attributed (p. 3-9, p. 3-13) this elevated Cd concentration to a migration of low pH of the ground water generated from the coal pile, and not from the migration of constituents from the RMI property.

b. <u>*Migration of Contaminants*</u>: Based on the water table contours near the eastern boundary of the facility, ground water appears to be flowing toward the east. The facility indicated that mounding of the water table at the east of the ponds "serves as an important hydrogeologic barrier to ground water from off-site" because of which water levels in all the ponds of Area E "have been maintained (and will continue to be) maintained by RMI at levels similar to those observed in the past." Due to this reason, the expected ground water flow in the past and in more recent years is to the east. This eastward flowing ground water may be carrying contaminants off-site from the facility area.

c. *Low pH Condition*: Table 2 summarized the pH data for the shallow and deep monitoring wells. The data of the 11/18/88 and 1/11/89 sampling events are from the Appendix 3 in the RFI report and the data of the February-March 1991 sampling event are from Table 3-4 in the CMS report.

Table 2. Summary of ground water pH data at the RMI Sodium facility during three sampling events.

Date	3S	4S	5S	6S	7S	8S	9S	10S	12S	13S
11/18/88	6.29	6.81	6.17	5.99	7.22	6.14	6.94	6.72		
1/11/89	4.05	4.96	6.38	5.62	5.99	5.95	6.49	6.55		
Feb.-Mar./91	7.39	7.14	7.16	6.86	7.52	7.02	7.45	7.29	4.25	6.86

Note: pH was not measured at 1S and 2S.

Date	4D	5D	7D	9D	11D
11/18/88	6.70	7.63		7.12	
1/11/89	4.54	6.49	6.1	5.95	6.7
Feb.-Mar./91					

A review of these results indicates the following:

i) Except at well 7S (pH 7.22), all the pH values of ground water from the shallow monitoring wells sampled during 11/18/88 and 1/11/89 events are lower than seven. Thus, shallow ground water in the facility area is neutral to slightly acidic.

ii) The pH values of 12S and 13S were 4.25 and 6.86, respectively.

iii) Low pH values comparable to that observed at 12S were found at 3S, 4S, and 6S during the 1/11/89 sampling event. This result indicates that a low pH condition

in shallow ground water existed within the facility. Thus, a mobilization of metals (e.g., Cd) may be caused by the acidic ground water condition within the facility.

d. *Ground Water Flow Near the Coal Pile*: The facility did not address whether ground water near the coal pile is flowing toward the monitoring well 12S. This information is needed to determine if the low pH at 12S is a result of ground water flow from the coal pile area.

The available data suggest that low pH in shallow ground water existed in the facility area and that off-site migration of metals (e.g., Cd) from the facility may have occurred. The facility should address these issues in the report.

8. Low pH at 4D: During the sampling of 1/11/89, the ground water at deep monitoring 4D had a pH of 4.54. During previous sampling, the pH value at this well was 6.70.

   a. The facility did not indicate any problem with this data. An explanation of this reduced pH value was not provided in the report.

   b. The facility did not include the pH data of February-March 1991 sampling from deep monitoring wells nor indicate if pH data were collected from deep monitoring wells.

   c. None of the other deep wells (5D, 7D, 9D, and 11D) indicated a pH value close to 4.54 suggesting that a low pH is not a background condition in the deeper zone.

   Thus, based on the data available, it is unclear if the low pH at 4D was temporary or represents some sort of error. The facility should address whether this pH data could be an indication of deterioration of water quality in the deeper zone.

9. Attainment of Corrective Measure Objective in Area E: The facility indicated (p. 3-10) that the "pond sludge in Area E should not be considered a source for potential future ground water contamination" and the ponds in Area E do not require a corrective action. It is indicated (p. 3-9) that the present levels of Ba and Cd in the shallow ground water in the vicinity of the ponds in Area E are approximately at or below the action levels.

   a. The data collected in February-March 1991 from 5S and 6S, both located near the eastern boundary close to the ponds in Area E, indicated an exceedence of the MCL of Cd (7.9 ug/L) at 6S. Ba concentration reached MCL at 6S. The concentrations of Cd also exceeded MCL at 5S and 6S during two previous sampling events on 11/18/88 and 1/11/89 (see Table 1).

   b. The facility suggested (p. 3-9, p. 3-10) that the lower concentrations of Cd and Ba in recent sampling is a result of periodical dredging and removal of sludge, last performed in 1991, and removal of Cd from the wastewater in 1989.

      i) It is unclear how the last periodical operation of dredging and sludge removal and wastewater treatment for Cd in 1989 lowered the concentration of Cd to a level that is no longer considered as a potential source of contamination and whether the lower concentrations of Cd and Ba at monitoring wells 5S and 6S are temporary.

      ii) The facility did not indicate the date of dredging in 1991 and whether this operation occurred prior to the sampling event of February-March 1991. The facility should evaluate whether there was an adequate time gap between these two events so that the effect of dredging and sludge removal can be reflected on the quality of shallow ground water.

   d. The facility in pages 3-8 and 3-13 indicated that one cause of this decrease in Cd concentration may be increased dilution by additional infiltrating water from "the extremely wet winter (1990-1991) in northeastern Ohio." If this is true, the lower concentrations of Cd at 5S and 6S are temporary. The ponds in Area E may be a source of contamination in years with a dryer winter.

The facility should address these issues and determine whether pond sludge in Area E can be a potential source of future ground water contamination.

10. Metal Transportation in Organic Complexes: The facility in the RFI report discussed the role of organic content of in water in transporting metals. It is indicated that formation of complexes with organic material will have a large effect on the chemical form of metals (e.g., Cd, Pb) and that in turn, will control the concentration of these metals in ground water. The facility did not adequately address the possibility that these metals may be transported in organic complexes in ground water.

    a. *Organic Carbon Content*: The CMS report indicated (p. 2-18) the presence of 11.5% organic carbon, based on analysis of one composite soil sample from SSB-5 to SSB-12 in the western portion of the facility area. No soil sample from the eastern portion of the facility, from where Cd may have migrated off-site to the east, was collected and analyzed.

    b. *Type of Organic Carbon*: The facility did not determine the nature or the reactivity of the organic content the soil sample. The presence of humic substances in the organic matter may provide many functional groups that may form complexes with metals and keep them in solution (Fetter, 1993, p. 269) during transportation.

    c. *Organic Carbon in Ground Water*: Although organic carbon content in the soil sample was high, the facility apparently did not determine the concentration of dissolved organic carbon (DOC) or total organic carbon (TOC) in ground water samples.

        i) The facility in the RFI report (p. 3-10) indicated that ground water samples from all monitoring wells, except 1S, 2S, and 7D, were analyzed for TOC. Section 6.1 in the RFI report summarized the results of ground water analysis in Table 6-1 (p. 6-2). Neither this table nor the CMS report included the results of TOC content in ground water samples. Whether the laboratory analyzed the ground water samples for TOC or the facility did not include the ground water TOC results cannot be determined because laboratory data sheets were not included in the CMS or RFI report.

        ii) TOC ranged from 2.0 mg/L to 14.0 mg/L in water collected from the French drain system and from 2.0 mg/L to 5.5 mg/L in water samples collected from the wastewater treatment ponds (Tables 6-6 and 6-8, RFI report). Based on the organic content in the soil, there may be a considerable amount of TOC in ground water.

Thus, the possibility that metals are migrating from the facility off-site, in organic complexes, cannot be ruled out based on the available data. The facility should address this issue.

11. The facility analyzed the total and dissolved concentrations of Ba and Cd. In some samples the

dissolved concentration is greater than the total concentration (Table 3). In Table 3, the difference is computed as a percent of the total analyte when the dissolved concentration is greater than the total concentration as well as the detection limit. Because of large difference between dissolved and total concentrations, the concentrations of Cd in 3S and 7S and of Ba in 4S should be considered as "estimated."

Table 3. Concentrations of dissolved and total concentrations of Ba and Cd in ground water sampled collected during the February-March 1991 event.

Well #	Total Ba (ug/L)	Dissolved Ba (ug/L)	Ba % Difference	Total Cd (ug/L)	Dissolved Cd (ug/L)	Cd % Difference
3S	1400	1300		<1.0	2.1	**>110**
4S	560	720	**28.6**	4.0	1.9	
5S	910	750		4.1	4.2	2.5
6S	2000	1200		7.9	7.7	
7S	270	310		1.4	1.8	**28.6**
8S		830			6.9	
9S	<200	<500		<1.0	<1.0	
10S	250	<500		<1.0	<1.0	

CONCLUSION

In the CMS report, the facility indicated that the pond sludge in Area E is not a potential source of contamination. The concentration of Cd exceeded the MCL at two wells, 5S and 6S, in this area during 11/18/88 and 1/11/89. During the latest sampling event (February-March 1991), Cd concentration decreased at these two wells, but exceeded MCL at 6S. The facility should address whether this lowering of Cd concentration in Area E is temporary. The facility indicated that elevated concentration of Cd at 12S is due to migration of low pH water from the coal pile area and not due to migration of contaminants from the facility. The direction of ground water flow at the coal pile area is not indicated in the report. A low pH condition also existed in the facility area. The presence of acidic water and dissolved organic carbon may mobilize metals, which in combination with a eastward movement of ground water at the eastern portion of the facility may have caused off-site migration of Cd and other metals. Low pH was also indicated at a deep monitoring well (4D). The facility should address whether this low pH could be an indication of deterioration of ground water quality in the deeper zone. The facility did not include all the results of 12S and 13S in the report. These results should be included and used to address the issue of off-site migration of contaminants from the facility. During the February-March 1991 sampling event, the dissolved concentration in some samples considerably exceeded the total concentration. For this reason, the facility should consider the concentrations of Cd in 3S and 7S and of Ba in 4S as "estimated."

ATTACHMENT 3

Groundwater Monitoring Plan for the Closed Landfill (Area A)
RMI Sodium Plant, Ashstabula, Ohio
Dated November 1997 and Received by the Ohio EPA on November 26, 1997

INDRODUCTION

This ground water monitoring plan was submitted for a closed landfill (Area A) at the RMI Sodium Plant (RMI) facility located near the intersection of State Road and East Sixth Street in Ashtabula, Ohio. This plan was submitted in response to the letter dated August 26, 1997 from the Ohio EPA to RMI with regard to the concerns related to sporadic seeps observed near the northern boundary of Area A. The submitted plan proposed a ground water monitoring system to address the origin of these seeps and to ensure that seeps are not caused by a failure of the clay cap over the landfill area.

COMMENTS

1. To evaluate the effects of the existing pond located at the east of Area A, the effect of recharge from the water coming out of the leaky water pipe, and the effects of storm events and seasonal variations on the water level elevations in Area A, the facility proposed a ground water monitoring system that consists of two existing shallow monitoring wells (RMI-3S, RMI-4S), five new piezometers (PZ-1 to PZ-5), and five new staff gauges (SG-1 to SG-5).

2. The flow directions of shallow ground water at the facility area varies and are apparently controlled by the locations of landfills and by surface topography. Based on the contour maps in Figs. 1-2 and 1-3, shallow ground water in Area A flows approximately to the southwest. RMI-3S appears to be located in the upgradient direction. PZ-1, PZ-2, PZ-3, PZ-5, PZ-4, and RMI-4S are progressively located in the downgradient direction.

3. The facility proposed to install at each piezometer location a one-inch diameter PVC casing and PVC screen down to a depth approximately 12 feet, without indicating the screen length. The facility should indicate the screen length.

4. The facility indicated that with a depth of 12 feet, the bottom of each piezometer will be approximately 2 feet below the water table. The basis of selection of this piezometer depth is not discussed in the plan. According to the data from RMI-3S, under the present condition the water table elevation can vary by more than two feet (highest of 639.60 feet in October of 1996 and lowest of 637.36 feet on January 10, 1989). Beside this change, there may be additional changes in water level when the pond is closed, and water from the leaking pipes at the eastern boundary of Area A is no longer available. The facility

should consider this potential change in the water table to ensure that the water table does not fall below the bottom of the piezometer screens.

5. The facility proposed to determine the vertical permeability of the soil in Area A to determine the potential infiltration through the clay cap.

   a. Four samples are planned to be collected by driving Shelby tubes with a Geoprobe pneumatic hammer. Apparently, the locations of these samples were not indicated in the submittal. The DDAGW recommends that at least one sample should be collected from the northern boundary of Area A, close to the location where seeps were observed. This sample may provide indications of any deterioration in the perfomance of the clay cap in that area.

   b. The technique to be used for determining the vertical permeability of the soil samples is not mentioned. The facility should discuss the selected laboratory technique in the ground water monitoring plan.

6. Although seeps were observed near the northern boundary of Area A, the proposed monitoring system included no piezometer or monitoring well in the area of concern roughly outlined by RMI-3S in the Area A, water tower, and pond. The facility should include monitoring locations within this area to evaluate the effects on water table elevations of the pond and the water leaking from pipes in the water tower. According to Fig. 1-3 there are two piezometers (PZ-18, PZ-19) already existing in this area. If these two piezometers are still in satisfactory condition, the facility should include them under the proposed monitoring system. Alternatively, the facility should consider installing two additional piezometers at locations close to PZ-18 and PZ-19.

7. The facility in page 1-2 indicated that "ground water flows from the eastern pond/water tower area generally to the south towards the surface drainage channels." The water table elevation contours in Fig. 1-3, however, indicate ground water flow towards the northwest. The facility should correct this discrepancy.

8. To evaluate the effects of four storm events on the ground water system, the facility proposed to monitor water table elevations within 48 hours of each significant (rainfall >2 inches) storm event. Whether a 48 hour period is long enough to see the effects of significant precipitation events based on the thickness and anticipated conductivity of the soil cap, however, is not addressed in the plan. The facility should consider the thickness and conductivity of the material above the water table and ensure that the proposed monitoring period is long enough to detect the effects of precipitation on the water table elevations in the study area.

9. The facility indicated that the observed seeps near the northern boundary of the landfill Area A represent a perched water zone on the clay cap formed by the precipitated water infiltrating into the soil zone. The proposed monitoring system design, however, included no component to test this assumption.

a. To determine whether the observed seeps are related to a perched water table, the facility should install additional piezometers at the northernmost portion of Area A. Each of these piezometers should be screened at an elevation equivalent to the uppermost portion of the clay cap.

b. The facility should also investigate the presence of a perched water table, and if present, determine its relation with seasonal changes in the water table in the glacial till and with significant precipitation events.

10. The facility did not provide adequate information regarding the stratigraphy of Area A and adjacent areas. Fig. 1-1 displays a cross-section AA' that is oriented along an east-west direction and passes through RMI-4S and RMI-1S. The facility should indicate the thickness and position of the clay cap and overlying soils and the contact between the landfill material and unweathered glacial till in this cross-section.

11. The objectives of the submitted ground water monitoring plan included determination of the effects of the repair of water pipes and the closure of the water pond (p. 1-3). This plan lacks a definite schedule for completing these two events. The facility should clearly indicate when and at what stage of the proposed monitoring program these operations will be performed. The seasonal changes in ground water elevation should be differentiated from the effects of these two events.

CONCLUSION

The facility proposed a ground water monitoring plan consisting of two existing monitoring wells, five new peizometers, and five new staff gauges to address the origin of the observed sporadic seeps at the northern boundary of Area A and to ensure that these seeps are not cause by a failure of the clay cap over the landfill. The piezometers are proposed to be 12 feet deep, and this depth apparently did not consider the potential drop in the water table caused by the closing of the pond and repairing the leaking pipes. The facility should evaluate the depth of piezometers and determine if a 48 hour period is appropriate to detect the effect of a precipitation event. The monitoring system included no component to evaluate water table elevations north of the seep area and to determine the presence of a perched water table over the clay cap. The facility should include the currently available piezometers near the seep area (PZ-18, PZ-19) or install new piezometers near these locations, and install shallow piezometers to detect the perched water table. The facility should address all the above comments.

ATTACHMENT 4

Draft Statement of Basis
RMI Sodium Facility, Ashtabula, Ohio OHD 000810242

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1. Ohio EPA agrees that all contaminated soils must be removed and transported off-site from Areas B, C, and G. Ohio EPA will not agree to placement of these wastes onto Area A. These areas must be backfilled after excavation to at least the original grade and/or surrounding surface.

2. Ohio EPA agrees that a **RCRA** cap must be constructed on Area A. The **RCRA** cap must be an appropriate on-site disposal facility, including a bottom liner, a leachate collection/management system, a storm water management system, **etc.** If less is required, then there must be money set aside to ensure that future remedial activities, **i.e.** clean closure or construction of an on-site disposal unit, can be performed. Please note, it is Ohio EPA's contention that leachate has seeped from the landfill. In addition, the cap has undergone uneven settlement and extensive erosion. Ohio EPA does not consider the present "cap" in any way adequate.

3. As noted in #2, money must be set aside to fund any additional cleanup activities necessitated if groundwater sampling via the monitoring wells demonstrates the presence of contaminants.

4. If Area E is not included in the proposed remedy, RMI Titanium Co. Sodium Plant must agree to closing the wastewaster treatment ponds (Area E) as RCRA units.

5. Areas D and F must be backfilled to at least original grade and/or the surrounding surface.

ATTACHMENT 5

OEPA COMMENTS ON RMI TITANIUM CO. SODIUM PLANT CMS

1.) The CMS stated, in part, on page ES-1 that the RFI concluded that the deep ground water zone had not been affected by plant activities. This conclusion was repeated several times, i.e. Table 3-1, column "Remarks on Action Levels", "Not relevant because no impacts to deep groundwater from site activities; barium in bedrock zone is naturally occurring.".

Levels of barium in the deep ground water as identified within the CMS ranged from 5,200 to 11,600 ppb. Discussion on pages 3-11 and 3-12 could not be evaluated because we do not have the RFI. Nonetheless, we find these deep natural occurring ground water levels of barium incredible.

High levels of barium in the ground water, coupled with the following facts lead us to conclude that disposed of wastes represent major sources of ground water contamination:

a.) that barium salt was a major waste stream;

b.) that barium salt was disposed of on-site; and

c.) that in one report wells 4D and 11D, existing near the closed land fill containing leachable barium waste, had barium levels as high as 18,000 ppb, and that these wells were in close proximity to a sand lens.

Ohio EPA has noted that the CMS included both of the following statements:

> "It was acknowledged that the barium (Ba) concentrations measured in the bedrock groundwater zone at the project site are not a result of activities at the RMI Sodium Plant and are naturally occurring." and

> "In addition, it was determined that it is not likely that deep bedrock groundwater has been affected by Sodium Plant activities."

The second statement is repeated several times, demonstrating that doubt still exists as to the role of the buried barium waste relevant to the contamination found to exist in the deep ground water. RMI Titanium Co.'s conclusion that the buried wastes have not contributed to the contamination of the deep ground water is the basis for many of their corrective measure decisions.

Ohio EPA questions the suitability of all of these decisions based upon the doubt expressed in the CMS by RMI Titanium Co. as well as this Agency's concerns regarding the interpretation that barium found to exist in the deep ground water is naturally occurring. Ohio EPA requests the opportunity to review all data utilized in reaching this conclusion.

2.) The RFI appears to conclude (p. ES-1) that the shallow ground water has been affected by RMI Titanium Co.'s activities and has identified barium (Ba) and cadmium (Cd) as constituents of concern. The CMS stated, in part, that "The presence of these constituents in groundwater is believed to be due, in part, to recharge of the groundwater from wastewater treatment ponds, and from the leaching of subsurface soils or buried wastes.".

In the Source Control Operable Unit RI Report for Fields Brook Site, Ca, as well as Ba and lead (Pb) were described as leachable potential hazardous constituents which had been disposed of on-site. Yet, in Table 3-1 the cadmium level is discounted as a constituent of concern, "Not relevant because Cd level is due to low pH groundwater generated from off-site coal pile.".

Ohio EPA is uncertain as to whether all shallow ground water has been affected by low pH ground water or that only the water from well 12-S has been affected. The critical fact is that the Ca found in the shallow ground water is the result of the improper on-site disposal of waste materials by RMI Titanium Co. Factors affecting its mobility are irrelevant. The fact remains that all currently in place wastes will continue to be potential sources of further contamination.

3.) It was stated, in part, on page ES-1 of the CMS that "Off site migration of the constituents of interest via surface water was investigated and found to not be a concern.". Yet it was also stated, in part, that "The presence of these constituents in groundwater is believed to be due, in part, to recharge of the groundwater from the wastewater treatment ponds, and from the leaching of subsurface soils or buried waste.". Further, it was stated, in part, within the Source Control Operable Unit RI Report for Fields Brook Site that "... at least a part of the shallow groundwater appears to discharge to DS tributary near the closed landfill ...". Therefore, Ohio EPA contends that contaminated surface water and the continued further contamination of surface water cannot be discounted.

The conclusion that shallow ground water will not be used for drinking, thus mitigating any concerns relevant to the further contamination of the shallow ground water, does not take into account the importance of all ground waters as future potable water sources and/or the importance of preventing contamination of surface waters.

4.) Essentially Area A has been discounted from the corrective measures study entirely and Ohio EPA questions the appropriateness of this action. Area A represents the largest physical waste disposal unit, six (6) acres. Even though this area was "closed", it is proposed that thirty years of accumulated waste materials, including wastes containing leachable sources of Pb, Ca, and Ba, not only to be left in place but be augmented by the addition of more potentially leachable wastes. OEPA finds the leaving un-stabilized leachable hazardous waste materials in a non-Best Available Technology (BAT) landfill constructed upon a sand lens totally unacceptable.

Designation of the Areas A, B, C, D, E, F, and G as a CAMU would not only "allow flexibility to select and implement the final corrective measures for the site" but would also sanction land disposal of restricted wastes. Furthermore, such an action would allow for the disposal of said wastes in a unit which does not meet the minimum technological requirements and/or standards of RCRA.

5.) It was stated, in part, within the CMS that "Deep soils will be addressed from the standpoint of the potential for contribution to groundwater contamination. No action levels for deep soils were proposed. As discussed above, groundwater does not exceed cleanup levels and, consequently, no corrective measures specific to the remediation of deep soils is included in the CMS.". Does this mean that present and future contamination of deep soils at the site is not a concern?

Ohio EPA again questions each of the determinations upon which the need for ground water remediation has been discounted:

a.) that acceptable range of carcinogenic risks are 1 x 10-4 to 1 x 10-6 for ingestion of groundwater;

b.) that "it is not likely that deep bedrock groundwater has been affected by Sodium Plant activities"; and

c.) the criterion that the shallow water-bearing zone would not be used for drinking.

In that this Agency questions these determinations and because deep soil concerns were dismissed based upon these determinations, Ohio EPA does not agree that the present and future contamination of the deep soils can be discounted.

6.) It is Ohio EPA's understanding that the organic contamination on-site has not been incorporated into the risk calculations. This Agency understands that the organic contamination found has been attributed to the migration of contaminants onto the property of RMI Titanium Co. from off-site. Ohio EPA contends that the only true picture of the risk posed by the site which can be calculated must include the organics. This may seem unfair, yet our role as a regulatory agency is to accurately assess risk to human health and environment.

7.) The CMS has identified Alternative 4E (Excavation of Areas B and C, And G; Disposal at Area A; No Further Action at Areas D and F) as the corrective measure alternative of choice for the RMI Sodium facility. Ohio EPA does not fully agree with selection of the proposed alternative. While Ohio EPA does agree that waste materials from areas B, C, and G should be completely excavated and/or removed, it does not believe that the wastes from these areas should be placed upon area A. Ohio EPA has expressed above its reservations concerning the existing integrity of area A. Further, Ohio EPA does not believe that adding more waste materials and a sub-standard cap to area A will enhance its environmental protection potential.

Therefore, Ohio EPA recommends that these excavated waste materials be shipped off-site to a permitted hazardous waste treatment/storage/disposal (TSD) facility. Ohio EPA does not agree with the proposed leaving of waste in place at area D. Area D in its present state appears to have only minimal environmental controls in effect if any. The waste in its current state appears to be quite vulnerable to the negative effects of surface water infiltration thus leading to an increased potential for leachate generation. Additionally, the relatively shallow depth at which waste exists does not help this situation.

Ohio EPA does not see closing this area in place as a preferred option due to technical requirements associated with performance of such an action. Therefore, Ohio EPA recommends that the waste materials contained within area D be excavated in total and shipped off-site to a permitted hazardous waste TSD facility.

It was indicated, in part, that area F would not pose a problem due to the estimated risk levels for this area. Since Ohio EPA has not had the opportunity to review the risk assessment for area F, this Agency cannot concur at this time with the "non-action" proposal made for area F. Ohio EPA would reserve its right to further comment on the proposal for area F once it has completed its review of the aforementioned risk assessment.

Ohio EPA is concerned that it may not be possible to fully remove all waste materials from all of the designated remediation areas by excavation. Should this be the case, Ohio EPA expects that these areas would be formally capped with a cap system designed to meet and/or exceed current BAT standards.

Ohio EPA questions the conclusions presented in section 3.2.2.4 of the CMS regarding area E. Specifically, Ohio EPA is concerned that elevated levels of hazardous constituents may exist in the soil materials currently being utilized as liners in waste water treatment ponds 1 through 5. Ohio EPA was unable to find any analytical data relevant to the investigation of these liners. Therefore, Ohio EPA requests that the soil liner for each pond be investigated for possible contamination. Until such data are provided Ohio EPA reserves its right to further comment on the applicability of corrective measures at area E. Note, Ohio EPA does not necessarily agree with the assertion that these ponds should be overlooked such that they may serve as some sort of make shift hydrogeologic barrier.

ATTACHMENT 6

Supplement to the Revised Final Corrective Measures Study
RMI Titanium Co. - Sodium Plant, Ashtabula, Ohio OHD 000810242

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1. RMI plans to stock pile excavated materials from Areas B, C and G. RMI must not create waste piles. A description of the management of the stock piled material must be included in future submittals.

2. RMI states: "*The existing cover on Area will be maintained under current operating and maintenance (O & M) procedures.*" It must be noted that over the last several years Ohio EPA has repeated noted problems with the cover on Area A. Ohio EPA has photographs of poor vegetative growth, ruts, erosion, and seeps.

3. Ohio EPA has not fully reviewed the HEA and therefore does not necessarily accept any of the conclusions based on the HEA.

4. RMI states: "*Area A was previously closed in 1981 in accordance with approval from the Ohio EPA.*" RMI is asked to provide documentation for this statement.

5. Ohio has a different interpretation of 40 CFR 264.552 than RMI who states on page 14: "... and consolidation of wastes within this CAMU will not require RMI to meet all minimum technology requirements." The CAMU designation is not a mechanism to avoid minimum technology requirements but a mechanism to allow new technologies.

Ohio EPA
State of Ohio Environmental Protection Agency

Northeast District Office
2110 E. Aurora Road
Twinsburg, Ohio 44087-1969
(330) 425-9171
FAX (330) 487-0769

George V. Voinovich
Governor

October 2, 1998

RE: RMI TITANIUM CO.
SODIUM PLANT
ASHTABULA COUNTY
OHD 000-810-242

Mr. Thomas Matheson
Mail Code HRP-8-J
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Matheson:

Ohio EPA has completed review of the following three documents submitted by RMI Titanium Co. Sodium Plant:

1. *RCRA Facility Investigation Report RMI Sodium Plant, Ashtabula, Ohio Volume 1 and II* (dated June 1990);
2. *Final Corrective Measures Study RMI Sodium Plant, Ashtabula. Ohio Volume 1* (dated March 1993); and
3. *Groundwater Monitoring Plan for the Closed Landfill (Area A) RMI Sodium Plant, Ashtabula, Ohio* (November 1997).

Ohio EPA's comments are enclosed as Attachment 1, 2, and 3 respectively for each of the above. Please notify our office if any of the comments in Attachment 1 or 2 will require a response from RMI Titanium Co. Sodium Plant. Ohio EPA will forward copies of each of the Attachments to RMI Titanium Co. Sodium Plant and will request responses to comments in Attachment 3.

If you have any questions please contact me at (330) 963-1250.

Sincerely,

Adrienne La Favre

Adrienne La Favre
District Representative
Division of Hazardous Waste
Management

ALF:cl
Attachments

cc: Frank Popotnik, DHWM, NEDO, OEPA
Richard Mason, RMI Titanium Co. Sodium Plant (no attachments)
Atiur Rahman, DDAGW, NEDO, OEPA
Ed Lim, DHWM, CO, OEPA

ATTACHMENT 1

RCRA Facility Investigation Report
RMI Sodium Plant, Ashtabula, Ohio, Volume I and II, dated June 1990
Received by the Ohio EPA on March 6, 1995

INTRODUCTION

The RCRA Facility Investigation Report (RFI) was submitted to the Ohio EPA on behalf of the RMI Sodium Plant (RMI) facility located near the intersection of State Road and East Sixth Street in Ashtabula, Ohio. This RFI was required to determine the nature and extent of possible contaminant releases from previous and existing solid waste management units at the RMI facility and to determine if the site contamination resulted from contaminants migrating into the facility area from off-site property.

COMMENTS

1. The facility included a water table elevation contour map based on data collected on 1/10/89. Another data set collected on 11/17/88 was available, but this data was not plotted on a contour map. The pattern of ground water flow in the site area, as indicated in the 1/10/89 map, appears to be complicated by the clay-lined ponds throughout the site. The general trend is mounding of ground water on the clay-lined landfills and ground water flow radially away from the landfills. The facility should contour the other data set, indicate significant differences in ground water flow direction, and address seasonal variations.

2. The statement in page 4-25 that "ground water occurs under fully confined conditions in the deeper shale bedrock water bearing zone" is unacceptable due to the following reasons:

   a. The facility indicated that the piezometric surface occurs "at or near the water table surface throughout the site," based on the data from monitoring wells 4D and 5D. Based on the data in Table 4-2, the elevation of the piezometric level at well 4D was about three feet lower than the water table at the shallow well 4S, located approximately at the same location. The water level at well 5S and the piezometric level at well 5D occur approximately at the same elevation. From these evidences, it appears that water in the bedrock shale is not under excessive pressure to indicate a hydrostatically confining condition.

   b. Based on estimates from off-site areas, the hydraulic conductivity of the unweathered till may range from 5.1×10^{-8} to 2.4×10^{-8} cm/sec with a geometric mean of 8.1×10^{-8} cm/sec. This range overlaps with the hydraulic conductivity range of the underlying bedrock from 1.7×10^{-6} to 6.2×10^{-8} cm/sec. Thus, from the stratigraphic point of view the unweathered till does not represent a confining layer for the bedrock shale.

c. Page 4-22 indicated that "only a minimal downward vertical gradient exists" between the water bearing zones in the glacial till and bedrock shale. If there is a "downward vertical hydraulic gradient," it is unclear how the bedrock shale can be "under fully confined conditions."

The facility should evaluate the above mentioned statement in the light of these issues based on a contour map of the potentiometric surface.

3. The facility in page 4-25 assumed that the slope of the piezometric surface is "toward the north."

   a. The elevation of the piezometric surface is known only from two monitoring wells, 4D and 5D, and thus, a contour map of the piezometric surface in the facility area was not prepared.

   b. The data of 11/17/88 and 1/10/89 monitoring events presented in Table 4-2 indicate that piezometric levels at wells 7D, 9D, and 11D were not stabilized and were rising. Thus, depending on the elevation of the piezometric level at these wells, the horizontal flow direction of ground water in bedrock shale may be different than the report indicated.

   c. The facility indicated that monitoring well 11D, located at the southwestern corner of the site area, is an upgradient well relative to the solid waste management units. The report lacks adequate data to indicate monitoring well 11D is an upgradient well.

To determine the slope of the piezometric surface and to determine if well 11D is in the upgradient direction, the facility should gather data from all the available deep wells in the site area (4D, 5D, 7D, 9D, 11D) after piezometric levels in these wells are stabilized.

4. The facility considered shallow monitoring wells 9S and 10S as background wells based on the following:

   a. Their locations are farthest from the solid waste management units.

   b. Ground water at these two locations is apparently least impacted by the solid waste management units.

   c. Ground water chemistry as indicated by major ion data is different at these locations.

However, as indicated by the facility, due to the complexity of the ground water flow pattern in the site area, the actual upgradient direction could be different.

5. At the facility area, the suspected contaminants in the closed landfills and former landfill areas included barium, cadmium, and lead. The highest concentrations of barium and cadnium in shallow (glacial till) ground water (Table 1) were found near the southern property boundary (4S) and the wastewater treatment ponds and landfill areas near the eastern property boundary (6S, 8S, 5S). Ground water exceeded the maximum contaminant levels (MCLs) of cadmium at 4S, 5S, 6S, 7S, and 8S. These results indicate that ground water in the glacial till zone is

impacted by the activities within the facility area.

Table 1: Highest concentration of barium, cadmium, and chromium at different locations in two sampling events on 11/17/88 and 1/11/89. S and D with the well number indicates depth, S is shallow (glacial till) and D is deep (shale). Exceedences of MCL are indicated in italics. Lead was below the detection limit (10.0 ug/L) at all locations.

Well #	**Barium** MCL = 2,000 ug/L	**Cadmium** MCL = 5 ug/L	**Chromium** MCL = 100 ug/L
3S	1,200	4.0	9.8
4S/ 4D	830/*6,800*	*14.3*/ 2.6	14.5/ 8.2
5S/ 5D	610/ *6,210*	*9.7*/ 2.8	9.8/ 8.3
6S	1,500	*25.7*	>5.0
7S/ 7D	>500/ >500	*8.3*/ >1.0	5.9/ 8.1
8S	1,900	*11.7*	13.0
9S/ 9D	>500/ 1,400	1.3/ 6.3	13.6/ 13.5
10S	>500	>1.0	8.4
11D	*18,000*	*7.9*	11.6

6. The facility calculated the specific capacity by using data from monitoring wells at the RMI facility and RMI Extrusion Plant sites because well yield data at or near the site area were unavailable. In this calculation, the facility used a value 0.3 for the "storativity" value of the weathered and unweathered tills and referred to Freeze and Cherry (1979). The appropriate term for storage in unconfined aquifers is specific yield or unconfined storativity, and not "storativity" which is used for confined aquifers. The usual range of specific yield noted in Freeze and Cherry (1979, p. 61) is 0.01 to 0.30. Since the specific yield in an unconfined aquifer represents actual dewatering of the saturated zone, and since the site area consists of weathered clayey till, the "storativity" value was considered very high by the DDAGW. A calculation based on a specific yield of 0.1 provided a total yield of 91 gpd as compared to 117 gpd calculated by the facility using a specific yield of 0.3. Thus, the yield values calculated by the facility are overestimated. The calculation of specific capacity and yield was apparently based on the assumptions that well loss is zero and the upper saturated zone can be completely dewatered and 80% of the lower saturated zone can be dewatered. The facility should use appropriate terminology to avoid confusion, should use a specific yield value within the lower part of the range noted in Freeze and Cherry (1979, p. 61), recalculate the specific capacity, and discuss these assumptions in the report.

7. The facility proposed that the ground water in the glacial till zone at the site area be classified as class IIIA (US EPA, 1986) based on the following criteria:

   a. The calculated yield less than 150 gpd, the yield needed to provide for the needs of any average-size household.

   b. No well or spring installed in the unconsolidated glacial till within the classification review area (delineated by a circle of two-miles radius from the center of the site area) is used as a source of drinking water.

8. The facility calculated a linear velocity of ground water flow varying from 0.7 ft/year throughout the majority of the site to 7.0 ft/ year immediately adjacent to the clay-lined wastewater treatment ponds. This calculation assumes a homogeneous saturated zone. Flow through preferential pathways, e.g., interconnected sand lenses, may result in a much faster ground water flow velocity than calculated in the report.

9. The presence of a DNAPL layer comprised of chlorinated solvents was detected in well 2S located at the southern boundary of the site area. Apparently, no DNAPL layer was detected at well 1S located about 350 feet west from 2S and screened at a similar depth interval. However, a relatively high concentration of volatile organic contaminants (VOCs) was detected in ground water at 1S and PZ-8, indicating that DNAPL compounds are being dissolved in ground water.

10. The monitoring wells 1S and 2S are screened in the unweathered glacial till that included a sandy till layer several feet thick. This sandy unit, also detected at 11D, may extend toward the southern boundary of the facility. The cross section through wells 2S, 1S, and 11D in Figure 4-9 indicates that the lower surface of this sandy till slopes toward 2S. Based on the assumption of a southward extension of the sandy till layer and the apparent slope of the lower surface of this layer, it is likely that if DNAPL is released upgradient it may migrate toward 2S.

11. The facility indicated that no chlorinated solvent was ever used at the site area and a chemical manufacturing facility located on the southern border of the site has historically discharged chlorinated solvents to streams and in settling lagoons that were not lined. From this information, it appears that the presence of a DNAPL layer at well 2S may be linked to the waste management practices from an off site area.

12. The thickness of the DNAPL layer at monitoring well 2S was not determined. A 10 feet thickness was estimated in the report. The facility should determine the vertical extent of this layer and estimate the volume of DNAPL.

13. The facility did not analyze ground water samples from 1S and 2S for the inorganic constituents and dissolved metals. Thus, whether some of the dissolved metals occur in these samples at elevated concentrations is unknown. The facility should consider this possibility.

14. The water table elevation at well 2S is indicated to be approximately 1.5 ft above ground surface (ags) in page 4-18 and approximately 1.0 ft ags in page 6-32. The latter elevation seems to be close to the actual elevations given in Table 4-2. The facility should correct this error.

15. The facility presented a contour map of static water table elevation in Figure 4-11.

   a. Water table elevation contours are indicated as continuous line and broken line. The facility should indicate the difference between these two types of contour lines in the map.

   b. The facility does not have any data control in support of the contour patterns indicated near the southern boundary and the northwestern corner of the site area. These contours should be removed from the map or be substantiated by ground water elevation data that was not included in the submittal.

   c. The facility indicated that the ground water flow direction in the glacial till is "perpendicular to the ground water contours." Some arrows representing the ground water flow in Fig. 4-11 are not at right angles to the ground water contours. The facility should correct this error in Fig. 4-11.

16. Since the weathered till contains large vertical fractures lined with fine sand, the ground water flow direction may be influenced by these fractures. As a result, the actual direction of ground water flow in this zone may deviate from the direction determined solely based on the contours of water table elevations. The facility should consider this possibility and indicate it in the report.

17. The facility did not discuss the underlying assumptions with the method used to estimate the hydraulic conductivity from recovery data. The facility should address whether the assumptions of homogeneous, isotropic, infinite aquifer, incompressible water and aquifer matrix are valid in the tested area. If any of these assumptions is violated, the facility should address the affect of this on the calculated value of hydraulic conductivity.

18. The facility did not include the chain of custody records within the report and did not indicate whether quality control/quality assurance samples for ground water analysis were a part of the sampling plan. The facility should include this information and chain of custody records in the report.

CONCLUSION

In this RCRA facility investigation report, the facility classified the ground water in the site area as class IIIA based on insufficient yield. These calculations used high a specific yield value. The facility should re-calculate the specific capacity by using a lower value of specific yield. The ground water in the glacial till zone is impacted by the activities within the facility area. The MCLs of cadmium were exceeded at 4S, 5S, 6S, 7S, and 8S. The water table elevation contour map is based on one data set. The facility should use additional data sets to address any change in ground water flow pattern in the site area. The facility indicated a fully confined condition in the bedrock without providing adequate evidence for this occurrence. If confining condition exists in the bedrock, a potentiometric surface map for bedrock should be prepared and ground water flow directions on this map should be indicated. At monitoring well 2S, the presence of a DNAPL layer was detected and was attributed to the waste management practices of a chemical manufacturing facility located adjacent to the southern boundary of the facility area. Based on the available information, it is likely that DNAPL released near the southern boundary may migrate through the sandy interval of the glacial till layer toward 2S.

REFERENCE

U.S. Environmental Protection Agency, 1986. Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy, Final Draft. Office of Ground-Water Protection, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

ATTACHMENT 2

Final Corrective Measures Study
RMI Sodium Plant, Ashtabula, Ohio
Volume I (dated March 1993 and Revised September 1994)
Received by the Ohio EPA on September 15, 1994.

INTRODUCTION

The report on the Final Corrective Measures Study (CMS) was submitted to the Ohio EPA on behalf of the RMI Sodium Plant (RMI) facility located near the intersection of State Road and East Sixth Street in Ashtabula, Ohio.

COMMENTS

1. The facility indicated (p. 2-20) that a "downward leaching of constituents from surficial soils to shallow ground water" is not occurring. This is contradicted by the following statements:

    a. Cadmium (Cd) in ground water in the vicinity of the ponds is "also related to leaching from the fill areas near the ponds" (p. 3-13).

    b. The elevated concentrations of barium (Ba) and Cd in shallow ground water "in the areas north (Area G) and east of the water treatment ponds (Area D)" are, in part, attributable to "the leaching of subsurface soils or buried wastes" (page 1-8).

    The facility should correct these discrepancies in the CMS report.

2. The facility indicated (p. 2-59, Table 2-26) the metal concentrations as "total" concentrations.

    a. According to the RCRA Facility Investigation (RFI) Report, RMI Sodium Plant (p. 3-9), the ground water samples for metal analysis were filtered in the field and thus, metal concentration represents the dissolved concentration.

    b. Table 3-4 in the CMS report summarized the February-March 1991 sampling data for Ba and Cd, both as "total" and "dissolved" concentrations. Apparently two sets of ground water samples (filtered and unfiltered) were collected and analyzed during this sampling event. However, the collection of unfiltered ground water samples is not indicated in the CMS report.

    The facility should clarify this sampling information within the report.

3. Based on the work completed during the RFI, the facility indicated (p. 1-7) that a confined condition exists in bedrock shale and that "the horizontal flow of ground water in the shale is toward the north to Lake Erie."

a. Confined condition in Shale: This is unacceptable due to the following reasons stated in the RFI report:

i) The elevation of the piezometric level at well 4D was about three feet lower than the water table at the shallow well 4S, located approximately at the same location.

ii) The water level at well 5S and the piezometric level at well 5D occur approximately at the same elevation.

It appears that water in the bedrock shale is not under excessive pressure to indicate a hydrostatically confining condition.

b. Ground Water Flow Direction: A northward flow direction of ground water in shale is not substantiated at the facility area by data.

i) The elevation of the piezometric surface is known only from two monitoring wells, 4D and 5D, and thus, a contour map of the piezometric surface in the facility area was not prepared.

ii) The data of 11/17/88 and 1/10/89 monitoring events presented in Table 4-2 indicate that piezometric levels at wells 7D, 9D, and 11D were not stabilized and were rising. Thus, depending on the elevation of the piezometric level at these wells, the horizontal flow direction of ground water in bedrock shale may be different than the report indicated.

The facility should re-evaluate the ground water condition in bedrock shale based on a contour map of the potentiometric surface. To determine the ground water flow direction, the facility should gather data from all the available deep wells (4D, 5D, 7D, 9D, and 11D).

4. The facility considered shallow monitoring wells 9S and 10S as background wells and indicated (p. 1-6) that "the ground water is mounded around the ponds at the site and the overall ground water flow directions radiate outward from the site." Considering this complexity in the ground water flow pattern in the site area, the actual upgradient direction could be different.

5. Documentation:

a. 11/18/88 and 1/11/89 Sampling: The facility in the RFI report indicated (p. 3-10) that the ground water "samples were preserved in accordance with U.S. EPA protocol." The chain of custody records indicating the preservatives added, time and day of sampling, temperature of the sample shipping container and the date and time when the samples were received by the analytical laboratory were not included in either of the CMS or RFI reports. Without evaluating the chain of custody records, the adequacy of sample preservation cannot be ascertained. The facility should include the chain of custody records in the report.

b. February-March 1991 Sampling: The facility did not include the field data sheets, chain of custody records, and laboratory data sheets of this sampling event in the CMS report. These documents should be included in the report.

6. Contaminant Concentrations in Shallow Monitoring Wells: The suspected contaminants in the closed landfills and former landfill areas included Ba, Cd, and lead (Pb). The facility indicated (p. 2-75, p. 3-12) that "concentration of constituents in shallow ground water monitoring wells are generally below maximum contaminant levels (MCLs)." This statement is misleading because of the following reasons:

a. Out of eight shallow monitoring wells (excluding 1S and 2S), Cd concentration exceeded the MCL in five wells (4S, 5S, 6S, 7S, and 8S) during the sampling of 11/18/88, in four wells (4S, 5S, 6S, and 8S) during the sampling of 1/11/89, and in one well (6S) during the sampling of February-March 1991. The action level of Pb was exceeded only in 10S during February-March 1991 sampling (Table 1).

Table 1: Concentrations of Ba, Cd, Chromium (Cr), and Pb at different shallow wells during three sampling events. Exceedences of MCL or action level are indicated in bold print.

Well #	Sampling Date	Barium MCL = 2,000 ug/L	Cadmium MCL = 5 ug/L	Chromium MCL = 100 ug/L	Lead Action Level = 15 ug/L
3S	11/18/88	910	4.0	9.8	<10
	1/11/89	1,200	1.4	9.7	<10
	Feb.-Mar./91	1,400	<1.0	19.8	11.8
4S	11/18/88	<500	**11.8**	14.5	<10.0
	1/11/89	830	**14.3**	8.0	<10.0
	Feb.-Mar./91	560	4.0	5.9	5.4
5S	11/18/88	530	**6.5**	9.8	<10.0
	1/11/89	610	**9.7**	6.9	<10.0
	Feb.-Mar./91	910	4.1	8.5	11.4
6S	11/18/88	1,500	**18.3**	<5.0	<10.0
	1/11/89	1,100	**25.7**	<5.0	<10.0
	Feb.-Mar./91	2,000	**7.9**	<5.0	<10.0
7S	11/18/88	<500	**8.3**	5.9	<10.0
	1/11/89	<500	4.0	<5.0	<10.0
	Feb.-Mar./91	270	1.4	8.2	4.4
8S	11/18/88	1,900	**11.7**	<5.0	<10.0
	1/11/89	830	**6.9**	13.0	<10.0
	Feb.-Mar./91	*	*	*	*

9S	11/18/88 1/11/89 Feb.-Mar./91	<500 <500 <500	<1.0 1.3 <1.0	<5.0 13.6 2.7	<10.0 <10.0 3.6
10S	11/18/88 1/11/89 Feb.-Mar./91	<500 <500 250	<1.0 <1.0 <1.0	6.1 8.4 19.6	<10.0 <10.0 **18.7**

* No sample was collected from 8S because well was dry at the time of sampling.

b. Ground water samples were not collected from the monitoring wells 1S and 2S, due to the presence of dense nonaqueous phase liquid (DNAPL) at these wells. Thus, the impact of the facility activities on ground water in 1S and 2S was not evaluated.

c. Well 8S was not sampled during the sampling of February-March 1991. Thus, the possibility of Cd exceeding its MCL during this sampling cannot be ruled out.

Thus, the above-mentioned statement is not true for the Cd concentration. The facility should make appropriate corrections to this statement.

6. Data of 12S and 13S: With regard to these two wells, the facility indicated (p. 1-12) that "..two wells (12S and 13S) were installed to provide information on the occurrence and quality of ground water in the glacial till water-bearing zone in the vicinity of the eastern boundary" and that the data for these wells were not included in Table 2-26 "because these wells are located outside of RMI property and isolated from the RMI site by a ground water divide." The results of 12S are briefly mentioned in page 3-9 of the CMS report. To determine whether water at 12S and 13S are affected by the facility, or the opposite, it is necessary to consider the water quality at these locations. The facility should include all the results of the two wells in the report.

7. Off-site Migration of Contaminants:

a. Influence of Coal Pile: The facility indicated that ground water in well 12S is influenced by a off-site coal pile located to the east of the site. According to Table 3-1, ground water collected from 12S during February-March 1991 contained dissolved Cd at a concentration (26.8 ug/L) exceeding the MCL. The facility attributed (p. 3-9, p. 3-13) this elevated Cd concentration to a migration of low pH of the ground water generated from the coal pile, and not from the migration of constituents from the RMI property.

b. *Migration of Contaminants*: Based on the water table contours near the eastern boundary of the facility, ground water appears to be flowing toward the east. The facility indicated that mounding of the water table at the east of the ponds "serves as an important hydrogeologic barrier to ground water from off-site" because of which water levels in all the ponds of Area E "have been maintained (and will continue to be) maintained by RMI at levels similar to those observed in the past." Due to this reason, the expected ground water flow in the past and in more recent years is to the east. This eastward flowing ground water may be carrying contaminants off-site from the facility area.

c. *Low pH Condition*: Table 2 summarized the pH data for the shallow and deep monitoring wells. The data of the 11/18/88 and 1/11/89 sampling events are from the Appendix 3 in the RFI report and the data of the February-March 1991 sampling event are from Table 3-4 in the CMS report.

Table 2. Summary of ground water pH data at the RMI Sodium facility during three sampling events.

Date	**3S**	**4S**	**5S**	**6S**	**7S**	**8S**	**9S**	**10S**	**12S**	**13S**
11/18/88	6.29	6.81	6.17	5.99	7.22	6.14	6.94	6.72		
1/11/89	4.05	4.96	6.38	5.62	5.99	5.95	6.49	6.55		
Feb.-Mar./91	7.39	7.14	7.16	6.86	7.52	7.02	7.45	7.29	4.25	6.86

Note: pH was not measured at 1S and 2S.

Date	**4D**	**5D**	**7D**	**9D**	**11D**
11/18/88	6.70	7.63		7.12	
1/11/89	4.54	6.49	6.1	5.95	6.7
Feb.-Mar./91					

A review of these results indicates the following:

i) Except at well 7S (pH 7.22), all the pH values of ground water from the shallow monitoring wells sampled during 11/18/88 and 1/11/89 events are lower than seven. Thus, shallow ground water in the facility area is neutral to slightly acidic.

ii) The pH values of 12S and 13S were 4.25 and 6.86, respectively.

iii) Low pH values comparable to that observed at 12S were found at 3S, 4S, and 6S during the 1/11/89 sampling event. This result indicates that a low pH condition

in shallow ground water existed within the facility. Thus, a mobilization of metals (e.g., Cd) may be caused by the acidic ground water condition within the facility.

d. *Ground Water Flow Near the Coal Pile*: The facility did not address whether ground water near the coal pile is flowing toward the monitoring well 12S. This information is needed to determine if the low pH at 12S is a result of ground water flow from the coal pile area.

The available data suggest that low pH in shallow ground water existed in the facility area and that off-site migration of metals (e.g., Cd) from the facility may have occurred. The facility should address these issues in the report.

8. <u>Low pH at 4D</u>: During the sampling of 1/11/89, the ground water at deep monitoring 4D had a pH of 4.54. During previous sampling, the pH value at this well was 6.70.

a. The facility did not indicate any problem with this data. An explanation of this reduced pH value was not provided in the report.

b. The facility did not include the pH data of February-March 1991 sampling from deep monitoring wells nor indicate if pH data were collected from deep monitoring wells.

c. None of the other deep wells (5D, 7D, 9D, and 11D) indicated a pH value close to 4.54 suggesting that a low pH is not a background condition in the deeper zone.

Thus, based on the data available, it is unclear if the low pH at 4D was temporary or represents some sort of error. The facility should address whether this pH data could be an indication of deterioration of water quality in the deeper zone.

9. <u>Attainment of Corrective Measure Objective in Area E</u>: The facility indicated (p. 3-10) that the "pond sludge in Area E should not be considered a source for potential future ground water contamination" and the ponds in Area E do not require a corrective action. It is indicated (p. 3-9) that the present levels of Ba and Cd in the shallow ground water in the vicinity of the ponds in Area E are approximately at or below the action levels.

a. The data collected in February-March 1991 from 5S and 6S, both located near the eastern boundary close to the ponds in Area E, indicated an exceedence of the MCL of Cd (7.9 ug/L) at 6S. Ba concentration reached MCL at 6S. The concentrations of Cd also exceeded MCL at 5S and 6S during two previous sampling events on 11/18/88 and 1/11/89 (see Table 1).

b. The facility suggested (p. 3-9, p. 3-10) that the lower concentrations of Cd and Ba in recent sampling is a result of periodical dredging and removal of sludge, last performed in 1991, and removal of Cd from the wastewater in 1989.

i) It is unclear how the last periodical operation of dredging and sludge removal and wastewater treatment for Cd in 1989 lowered the concentration of Cd to a level that is no longer considered as a potential source of contamination and whether the lower concentrations of Cd and Ba at monitoring wells 5S and 6S are temporary.

ii) The facility did not indicate the date of dredging in 1991 and whether this operation occurred prior to the sampling event of February-March 1991. The facility should evaluate whether there was an adequate time gap between these two events so that the effect of dredging and sludge removal can be reflected on the quality of shallow ground water.

d. The facility in pages 3-8 and 3-13 indicated that one cause of this decrease in Cd concentration may be increased dilution by additional infiltrating water from "the extremely wet winter (1990-1991) in northeastern Ohio." If this is true, the lower concentrations of Cd at 5S and 6S are temporary. The ponds in Area E may be a source of contamination in years with a dryer winter.

The facility should address these issues and determine whether pond sludge in Area E can be a potential source of future ground water contamination.

10. <u>Metal Transportation in Organic Complexes</u>: The facility in the RFI report discussed the role of organic content of in water in transporting metals. It is indicated that formation of complexes with organic material will have a large effect on the chemical form of metals (e.g., Cd, Pb) and that in turn, will control the concentration of these metals in ground water. The facility did not adequately address the possibility that these metals may be transported in organic complexes in ground water.

    a. *<u>Organic Carbon Content</u>*: The CMS report indicated (p. 2-18) the presence of 11.5% organic carbon, based on analysis of one composite soil sample from SSB-5 to SSB-12 in the western portion of the facility area. No soil sample from the eastern portion of the facility, from where Cd may have migrated off-site to the east, was collected and analyzed.

    b. *<u>Type of Organic Carbon</u>*: The facility did not determine the nature or the reactivity of the organic content the soil sample. The presence of humic substances in the organic matter may provide many functional groups that may form complexes with metals and keep them in solution (Fetter, 1993, p. 269) during transportation.

    c. *<u>Organic Carbon in Ground Water</u>*: Although organic carbon content in the soil sample was high, the facility apparently did not determine the concentration of dissolved organic carbon (DOC) or total organic carbon (TOC) in ground water samples.

        i) The facility in the RFI report (p. 3-10) indicated that ground water samples from all monitoring wells, except 1S, 2S, and 7D, were analyzed for TOC. Section 6.1 in the RFI report summarized the results of ground water analysis in Table 6-1 (p. 6-2). Neither this table nor the CMS report included the results of TOC content in ground water samples. Whether the laboratory analyzed the ground water samples for TOC or the facility did not include the ground water TOC results cannot be determined because laboratory data sheets were not included in the CMS or RFI report.

        ii) TOC ranged from 2.0 mg/L to 14.0 mg/L in water collected from the French drain system and from 2.0 mg/L to 5.5 mg/L in water samples collected from the wastewater treatment ponds (Tables 6-6 and 6-8, RFI report). Based on the organic content in the soil, there may be a considerable amount of TOC in ground water.

Thus, the possibility that metals are migrating from the facility off-site, in organic complexes, cannot be ruled out based on the available data. The facility should address this issue.

11. The facility analyzed the total and dissolved concentrations of Ba and Cd. In some samples the

dissolved concentration is greater than the total concentration (Table 3). In Table 3, the difference is computed as a percent of the total analyte when the dissolved concentration is greater than the total concentration as well as the detection limit. Because of large difference between dissolved and total concentrations, the concentrations of Cd in 3S and 7S and of Ba in 4S should be considered as "estimated."

Table 3. Concentrations of dissolved and total concentrations of Ba and Cd in ground water sampled collected during the February-March 1991 event.

Well #	Total Ba (ug/L)	Dissolved Ba (ug/L)	Ba % Difference	Total Cd (ug/L)	Dissolved Cd (ug/L)	Cd % Difference
3S	1400	1300		<1.0	2.1	**>110**
4S	560	720	**28.6**	4.0	1.9	
5S	910	750		4.1	4.2	2.5
6S	2000	1200		7.9	7.7	
7S	270	310		1.4	1.8	**28.6**
8S		830			6.9	
9S	<200	<500		<1.0	<1.0	
10S	250	<500		<1.0	<1.0	

CONCLUSION

In the CMS report, the facility indicated that the pond sludge in Area E is not a potential source of contamination. The concentration of Cd exceeded the MCL at two wells, 5S and 6S, in this area during 11/18/88 and 1/11/89. During the latest sampling event (February-March 1991), Cd concentration decreased at these two wells, but exceeded MCL at 6S. The facility should address whether this lowering of Cd concentration in Area E is temporary. The facility indicated that elevated concentration of Cd at 12S is due to migration of low pH water from the coal pile area and not due to migration of contaminants from the facility. The direction of ground water flow at the coal pile area is not indicated in the report. A low pH condition also existed in the facility area. The presence of acidic water and dissolved organic carbon may mobilize metals, which in combination with a eastward movement of ground water at the eastern portion of the facility may have caused off-site migration of Cd and other metals. Low pH was also indicated at a deep monitoring well (4D). The facility should address whether this low pH could be an indication of deterioration of ground water quality in the deeper zone. The facility did not include all the results of 12S and 13S in the report. These results should be included and used to address the issue of off-site migration of contaminants from the facility. During the February-March 1991 sampling event, the dissolved concentration in some samples considerably exceeded the total concentration. For this reason, the facility should consider the concentrations of Cd in 3S and 7S and of Ba in 4S as "estimated."

ATTACHMENT 3

Groundwater Monitoring Plan for the Closed Landfill (Area A)
RMI Sodium Plant, Ashstabula, Ohio
Dated November 1997 and Received by the Ohio EPA on November 26, 1997

INDRODUCTION

This ground water monitoring plan was submitted for a closed landfill (Area A) at the RMI Sodium Plant (RMI) facility located near the intersection of State Road and East Sixth Street in Ashtabula, Ohio. This plan was submitted in response to the letter dated August 26, 1997 from the Ohio EPA to RMI with regard to the concerns related to sporadic seeps observed near the northern boundary of Area A. The submitted plan proposed a ground water monitoring system to address the origin of these seeps and to ensure that seeps are not caused by a failure of the clay cap over the landfill area.

COMMENTS

1. To evaluate the effects of the existing pond located at the east of Area A, the effect of recharge from the water coming out of the leaky water pipe, and the effects of storm events and seasonal variations on the water level elevations in Area A, the facility proposed a ground water monitoring system that consists of two existing shallow monitoring wells (RMI-3S, RMI-4S), five new piezometers (PZ-1 to PZ-5), and five new staff gauges (SG-1 to SG-5).

2. The flow directions of shallow ground water at the facility area varies and are apparently controlled by the locations of landfills and by surface topography. Based on the contour maps in Figs. 1-2 and 1-3, shallow ground water in Area A flows approximately to the southwest. RMI-3S appears to be located in the upgradient direction. PZ-1, PZ-2, PZ-3, PZ-5, PZ-4, and RMI-4S are progressively located in the downgradient direction.

3. The facility proposed to install at each piezometer location a one-inch diameter PVC casing and PVC screen down to a depth approximately 12 feet, without indicating the screen length. The facility should indicate the screen length.

4. The facility indicated that with a depth of 12 feet, the bottom of each piezometer will be approximately 2 feet below the water table. The basis of selection of this piezometer depth is not discussed in the plan. According to the data from RMI-3S, under the present condition the water table elevation can vary by more than two feet (highest of 639.60 feet in October of 1996 and lowest of 637.36 feet on January 10, 1989). Beside this change, there may be additional changes in water level when the pond is closed, and water from the leaking pipes at the eastern boundary of Area A is no longer available. The facility

should consider this potential change in the water table to ensure that the water table does not fall below the bottom of the piezometer screens.

5. The facility proposed to determine the vertical permeability of the soil in Area A to determine the potential infiltration through the clay cap.

   a. Four samples are planned to be collected by driving Shelby tubes with a Geoprobe pneumatic hammer. Apparently, the locations of these samples were not indicated in the submittal. The DDAGW recommends that at least one sample should be collected from the northern boundary of Area A, close to the location where seeps were observed. This sample may provide indications of any deterioration in the perfomance of the clay cap in that area.

   b. The technique to be used for determining the vertical permeability of the soil samples is not mentioned. The facility should discuss the selected laboratory technique in the ground water monitoring plan.

6. Although seeps were observed near the northern boundary of Area A, the proposed monitoring system included no piezometer or monitoring well in the area of concern roughly outlined by RMI-3S in the Area A, water tower, and pond. The facility should include monitoring locations within this area to evaluate the effects on water table elevations of the pond and the water leaking from pipes in the water tower. According to Fig. 1-3 there are two piezometers (PZ-18, PZ-19) already existing in this area. If these two piezometers are still in satisfactory condition, the facility should include them under the proposed monitoring system. Alternatively, the facility should consider installing two additional piezometers at locations close to PZ-18 and PZ-19.

7. The facility in page 1-2 indicated that "ground water flows from the eastern pond/water tower area generally to the south towards the surface drainage channels." The water table elevation contours in Fig. 1-3, however, indicate ground water flow towards the northwest. The facility should correct this discrepancy.

8. To evaluate the effects of four storm events on the ground water system, the facility proposed to monitor water table elevations within 48 hours of each significant (rainfall >2 inches) storm event. Whether a 48 hour period is long enough to see the effects of significant precipitation events based on the thickness and anticipated conductivity of the soil cap, however, is not addressed in the plan. The facility should consider the thickness and conductivity of the material above the water table and ensure that the proposed monitoring period is long enough to detect the effects of precipitation on the water table elevations in the study area.

9. The facility indicated that the observed seeps near the northern boundary of the landfill Area A represent a perched water zone on the clay cap formed by the precipitated water infiltrating into the soil zone. The proposed monitoring system design, however, included no component to test this assumption.

a. To determine whether the observed seeps are related to a perched water table, the facility should install additional piezometers at the northernmost portion of Area A. Each of these piezometers should be screened at an elevation equivalent to the uppermost portion of the clay cap.

b. The facility should also investigate the presence of a perched water table, and if present, determine its relation with seasonal changes in the water table in the glacial till and with significant precipitation events.

10. The facility did not provide adequate information regarding the stratigraphy of Area A and adjacent areas. Fig. 1-1 displays a cross-section AA' that is oriented along an east-west direction and passes through RMI-4S and RMI-1S. The facility should indicate the thickness and position of the clay cap and overlying soils and the contact between the landfill material and unweathered glacial till in this cross-section.

11. The objectives of the submitted ground water monitoring plan included determination of the effects of the repair of water pipes and the closure of the water pond (p. 1-3). This plan lacks a definite schedule for completing these two events. The facility should clearly indicate when and at what stage of the proposed monitoring program these operations will be performed. The seasonal changes in ground water elevation should be differentiated from the effects of these two events.

CONCLUSION

The facility proposed a ground water monitoring plan consisting of two existing monitoring wells, five new peizometers, and five new staff gauges to address the origin of the observed sporadic seeps at the northern boundary of Area A and to ensure that these seeps are not cause by a failure of the clay cap over the landfill. The piezometers are proposed to be 12 feet deep, and this depth apparently did not consider the potential drop in the water table caused by the closing of the pond and repairing the leaking pipes. The facility should evaluate the depth of piezometers and determine if a 48 hour period is appropriate to detect the effect of a precipitation event. The monitoring system included no component to evaluate water table elevations north of the seep area and to determine the presence of a perched water table over the clay cap. The facility should include the currently available piezometers near the seep area (PZ-18, PZ-19) or install new piezometers near these locations, and install shallow piezometers to detect the perched water table. The facility should address all the above comments.

DRAFT STATEMENT OF BASIS
RMI SODIUM FACILITY
ASHTABULA, OHIO
OHD000810242

TASK 03 DELIVERABLE

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Contract No.	**: 68-W4-0006**
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February 9, 1996

DRAFT STATEMENT OF BASIS
RMI SODIUM FACILITY
ASHTABULA, OHIO
OHD000810242

INTRODUCTION

The RMI Titanium Company - Sodium Plant (RMI Sodium) is located at 46 State Road in Ashtabula, Ohio near the intersection of State Road and East 6th Street (Figure 1). The United States Environmental Protection Agency (U.S. EPA) identification number for RMI Sodium is OHD 000 810 242.

From 1950 to 1992, RMI Sodium produced sodium and chlorine. Presently, RMI Sodium is being decommissioned and major production activities have ceased. The only activities currently conducted are sodium recovery from wastes, treatment of reactive wastes, and *Resource Conservation and Recovery Act (RCRA)* corrective action activities.

Corrective action activities at RMI Sodium include conducting a *RCRA Facility Investigation (RFI)*, a Supplemental RFI and a *Corrective Measures Study (CMS)*, which have all been completed; the drafting and public review of this document, which is called a *Statement of Basis (SB)*; and, completing the *Corrective Measures Implementation (CMI)*. Figure 2 is a flowchart which shows the general corrective action process.

This SB is a public participation document which summarizes U.S. EPA's preferred corrective measure technology for remediating contaminated soils at RMI Sodium and solicits public comment on the selection of the technology. The SB accomplishes the following:

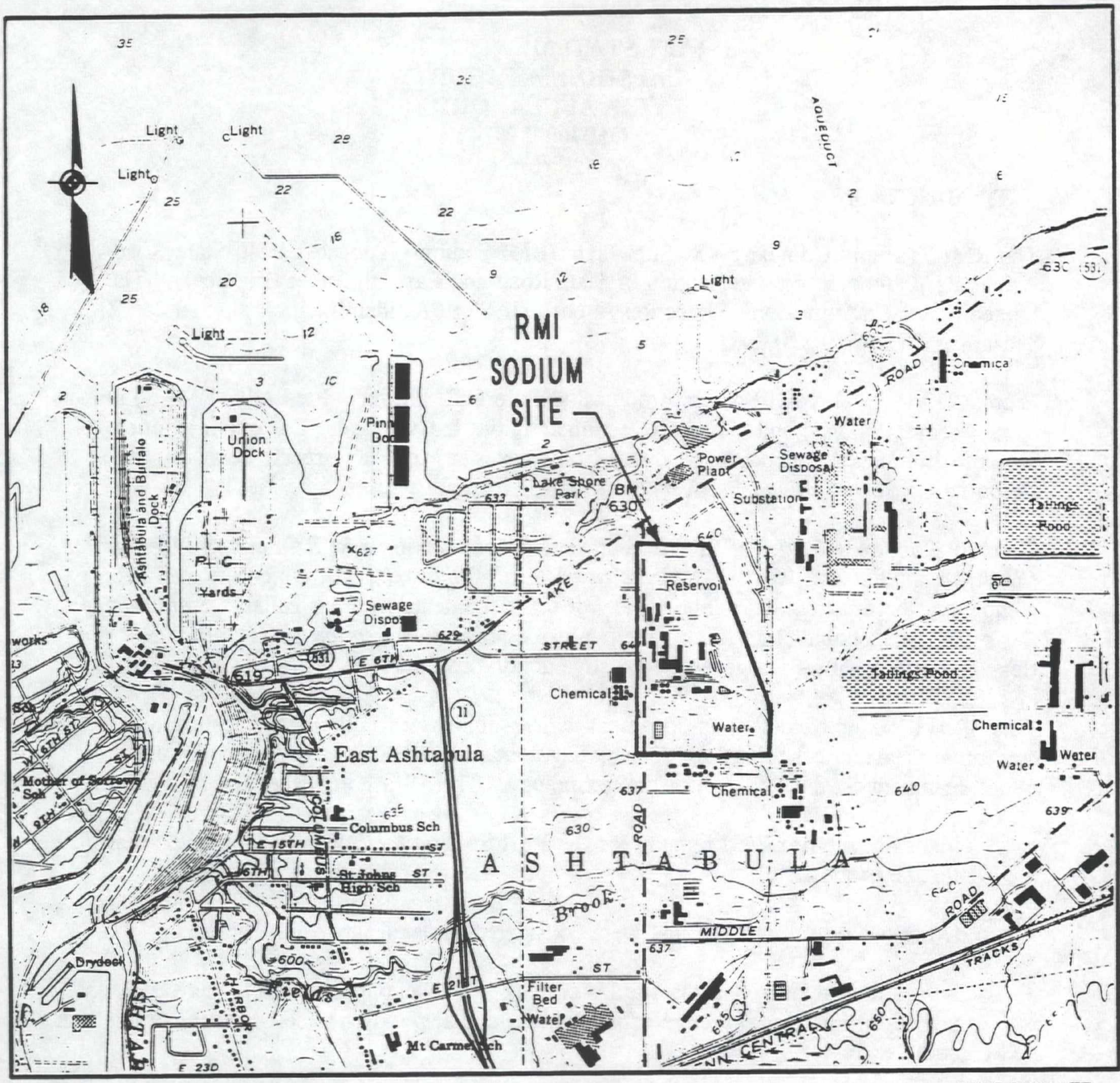
- Identifies the proposed remedy for the RMI Sodium *facility* and explains the reasons for the proposal;

- Describes other remedies that were considered in detail in the CMS report;

- Serves as a summary of the site history, the RFI, Supplemental RFI, and CMS, as well as brings the corrective action process one step closer to satisfactory completion; and,

- Solicits public review and comment on all possible remedies considered in the RFI, Supplemental RFI, CMS, and any other plausible remedy sources.

U.S. EPA may modify the proposed remedy or select another remedy based on new information or public comments. Therefore, the public is encouraged to review and comment on all remedial alternatives. The public can be involved in the remedy selection process by:

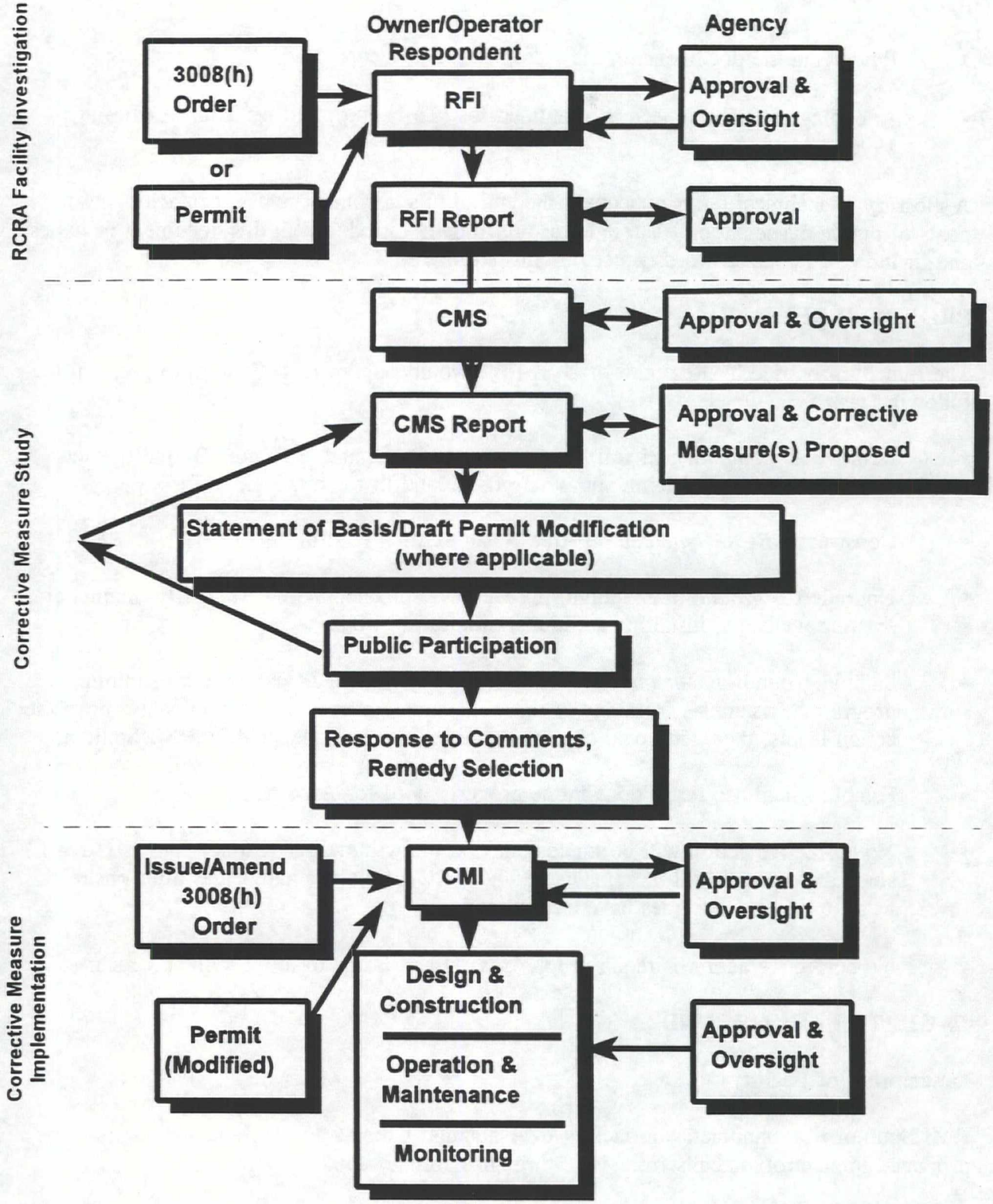


SOURCE: ASHTABULA NORTH, OHIO USGS QUADRANGLE
SCALE 1: 24000

APPROXIMATE SCALE IN FEET
0 1000 2000

RMI SODIUM ASHTABULA, OHIO SITE LOCATION PLAN	FIGURE 1

155007–A.DWG



RMI SODIUM ASHTABULA, OHIO THE CORRECTIVE ACTION DECISION MAKING PROCESS	FIGURE 2

- Reviewing the documents in the Administrative Record; and,

- Attending the public meeting scheduled for **(To be supplied by Tom Matheson)**, 1996.

A glossary of technical terms appears at the end of this document to assist in achieving the goals of public participation. These terms are initially introduced in this document in italics, and include all italicized words preceding this statement.

PROPOSED REMEDY

The remedy proposed by Region 5 of U.S. EPA would require RMI Sodium to perform the following tasks:

- Remove all contaminated soil from site Areas B, C, and G (Figure 3) and transport the contaminated soil to an approved offsite landfill for disposal;

- Construct a *RCRA-type cap* on Area A, an existing landfill on site;

- Upgrade the *groundwater* monitoring well system surrounding Area A by maintaining existing wells and installing additional monitoring wells;

- Sample groundwater *monitoring wells* surrounding Area A via a regular sampling program. If samples from any of the wells should ever show contaminants above the action levels, then additional cleanup activities will be conducted by RMI Sodium;

- Establish land use restrictions in the property deed for Area A;

- No corrective action will be implemented at the wastewater treatment ponds (Area E), since these ponds will be remediated under RCRA closure authorities after onsite waste treatment activities have ceased; and

- No corrective action is required for Areas D and F due to low health risk factors.

FACILITY BACKGROUND

Description of Facility

RMI Sodium is a manufacturing facility in Ashtabula, Ohio at which elemental sodium was produced in electrolytic cells from 1950 through February 1992.

RMI Sodium lies on approximately 90 acres located in a highly industrial area of Ashtabula, approximately ¼ mile south of Lake Erie. RMI Sodium consists of various buildings,

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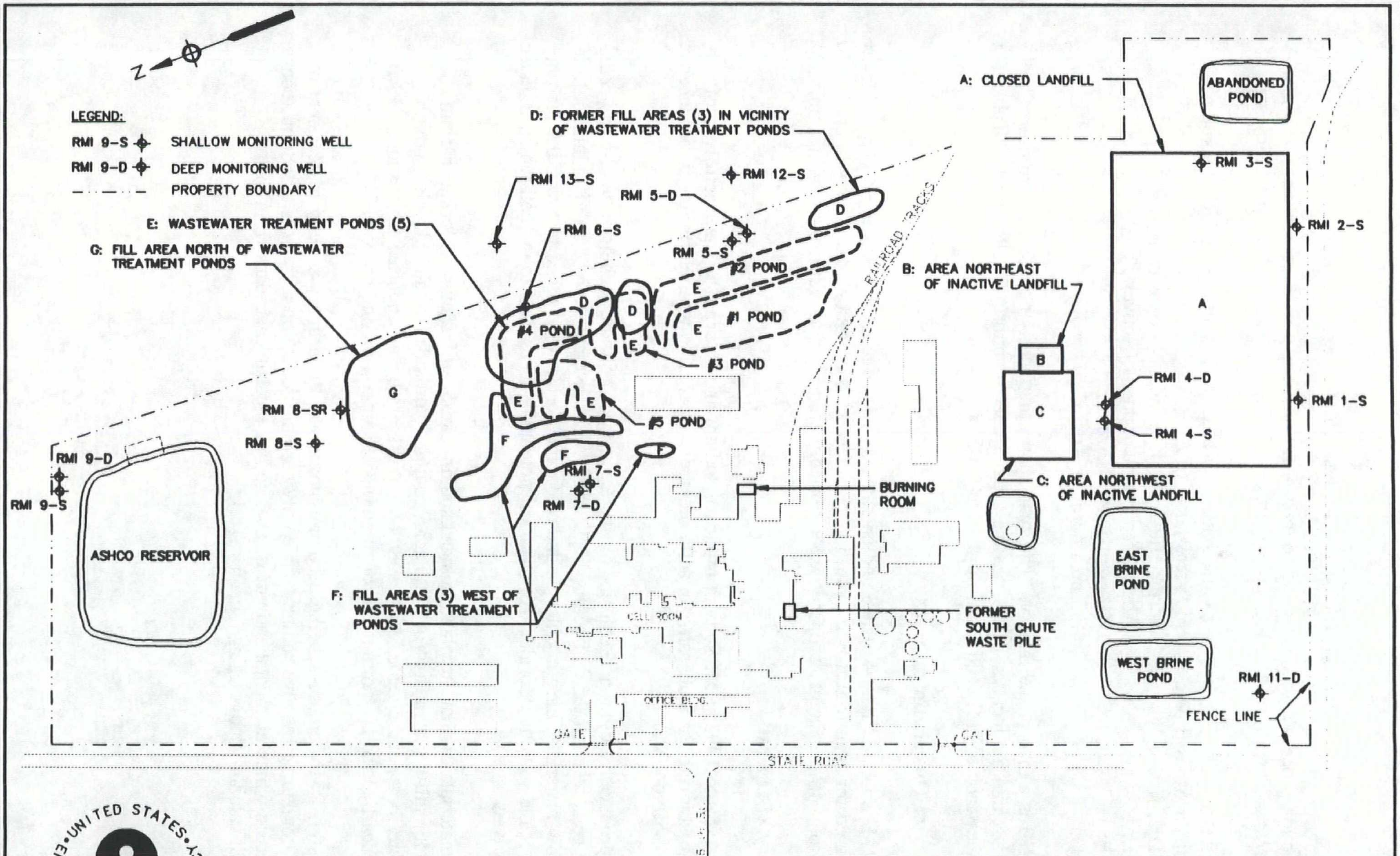

RMI SODIUM
ASHTABULA, OHIO

GENERAL SITE PLAN

FIGURE 3

production process components, waste treatment units, and *solid waste management units (SWMUs)*. The SWMUs which were addressed during the CMS include the following:

Area A:	Inactive landfill located at the south end of RMI Sodium
Combined Areas B & C:	Fill areas north of Area A
Area D:	Former fill areas in the vicinity of Area E
Area E:	Wastewater treatment ponds (Active)
Area F:	Fill areas west of Area E
Area G:	Fill area north of Area E

Figure 3 is a map of the facility. This map shows the facility boundary, locations of the SWMUs, and the location of the existing groundwater monitoring wells on site. Table 1 describes each SWMU addressed during the CMS.

History of Ownership

The RMI Sodium Plant is owned and operated by RMI Titanium Company. The facility was purchased for industrial use in 1948, but manufacturing operations did not begin until 1950. Prior to 1948 the facility property was reportedly used for non-industrial activities only.

History of Operation

From 1950 to 1992, RMI Sodium produced sodium and chlorine by the electrolysis of sodium chloride, or table salt. In addition, sodium peroxide was intermittently produced from 1950 to 1979.

RMI produced sodium and chlorine by the electrolysis of sodium chloride in *Down's cells*. These cells were closed, refractory lined, steel vessels which received solid sodium chloride as a raw material. Barium chloride and calcium chloride were added to lower the melting point of the sodium chloride. An electrical potential was applied to the cell which initiated electrolysis.

Raw materials used at the plant included sodium carbonate, calcium chloride, barium chloride, sulfuric acid, hydrochloric acid, sodium hydroxide, cobalt chloride, sodium bisulfite, lime, and aqueous *brine* solution. Weak brine was imported from another RMI plant nearby, and concentrated through an onsite solution mining process.

Presently, RMI Sodium is being decommissioned and the primary activity is treatment of waste containing reactive sodium. The only current production activity is a sodium recovery process in which elemental sodium is separated by mechanical means from the sodium/calcium sludge using a centrifuge.

TABLE 1
PROFILE OF SOLID WASTE MANAGEMENT UNITS (SWMUs)

Map Code	Name	Approx. Dimensions	Status	Period of Use	Potential Hazardous Constituents (As Reported in RFI)	Other Information
A	Inactive landfill	400 ft. x 700 ft.	Inactive	1950 to 1981	barium, cadmium, lead	Inactive since 1981; clay/topsoil cover
B	Fill area northeast of inactive landfill	50 ft. x 100 ft.	Inactive	1950 to 1981	barium, cadmium, lead	Some wastes reportedly removed to landfill in 1981
C	Fill area northwest of inactive landfill	150 ft. x 200 ft.	Inactive	1960s to 1981	barium, cadmium, lead	Some wastes reportedly removed to landfill in 1981
D	Former fill areas in vicinity of wastewater treatment ponds	#1 @ 150 ft. x 300 ft. #2 @ 80 ft. x 120 ft. #3 @ 60 ft. x 175 ft.	Inactive	1950s to 1960s	barium, cadmium, lead	Two of the fill areas encompassed area now occupied by Wastewater Treatment Pond Nos. 2, 3, 4, 5; excavated wastes placed in fill areas north of ponds during pond construction; filled low areas
E	Wastewater Treatment Ponds					Perimeter french drain installed in 1980
	Pond No. 1	100 ft. x 400 ft. (1.7 mil gal)	Active	1950 to present	chromium, lead, selenium, silver	
	Pond No. 2	40 ft. x 500 ft. (1.4 mil gal)	Active	1956 to present	chromium, lead, selenium, silver	
	Pond No. 3	170 ft. x 170 ft. (1.5 mil gal)	Active	1967 to present	chromium, lead, selenium, silver	
	Pond No. 4	170 ft. x 200 ft. (1.3 mil gal)	Active	1971 to present	chromium, lead, selenium, silver	
	Pond No. 5	150 ft. x 150 ft. (1.5 mil gal)	Active	1971 to present	chromium, lead, selenium, silver	
F	Fill areas west of wastewater treatment ponds	200 ft. x 500 ft. (overall)	Inactive	1966 to 1967	barium, cadmium, lead	Filled low areas
G	Fill area north of wastewater treatment ponds	200 ft. x 300 ft.	Inactive	1956 to 1976	barium, cadmium, lead	Received excavated materials from present site of wastewater treatment ponds during pond construction; filled low areas

(RFI Report, 6/90, p. 5-3)

Treatment of Production Wastes

RMI Sodium's past production processes generated three types of *hazardous waste*: 1) hazardous cell bath waste contaminated with barium and reactive sodium (reacts violently with water and also with oxygen when burned); 2) waste sulfuric acid, a corrosive substance; and, 3) waste sodium/calcium sludge containing reactive sodium. The hazardous cell bath waste was a product of the electrolysis process which took place in the Down's cells. This waste was marginally toxic for barium and also contained some reactive sodium. The cell bath waste was stored on site until it could be hauled off site where it was stabilized and disposed in a landfill.

Sulfuric acid was a by-product generated during the production and handling of chlorine. This waste sulfuric acid was either sold or neutralized with lime on site.

The sodium/calcium sludge is another type of cell bath waste that was a by-product of the electrolysis process. This sludge waste was subjected to a recovery process in which sodium was physically separated from the sludge. The pure sodium was then sold. The remaining waste, which still contained some reactive sodium was burned in a thermal oxidation unit (burning room). The non-hazardous ash was washed with water from the burning room. The dissolved ash solution was pumped to the wastewater treatment ponds (Area E) where it settled to the bottom of the ponds.

Area E consists of five wastewater treatment ponds. In addition to settling the ash from the burning room, these ponds were collectively used to settle suspended solids from chlorine neutralization operations, sludge from sulfuric acid neutralization operations, brine treatment solids, and suspended material from other in plant waste streams.

The ponds were *dredged* periodically. The sludge was removed by clamshell bucket and trucks for disposal at an approved landfill site. Records show that the dredged sludge has tested to be non-hazardous.

Currently there is some sodium/calcium sludge that remains from previous electrolysis processes. This sludge is being treated using the processes described above. As RMI Sodium is being decommissioned, reactive sodium is discovered in containers, receivers, valves, piping and filter parts that are to be repaired or scrapped. These contaminated parts and equipment are also treated in the burning room. Another RMI Titanium Company, the Metals Reduction Plant, located in Ashtabula, Ohio is also being decommissioned. Materials containing reactive sodium are transported to RMI Sodium where they are treated. RMI Sodium is permitted to burn 300,000 pounds of sodium-contaminated waste per year in the burning room.